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TABLE OF CONTENTS

Greater Educational Returns from Industrial Arts in the Junior High School 1
Robert H. Rodgers

Britannia Metal—X—The Decoration of Britannia 4
Wm. H. Varnum

A One-Year Course in Farm Shop Work 9
D. W. Hamilton

Posters for Eighth Grade Pupils 13
Ora Strange Kilborn

The Value of Science in Vocational Education 15
Percy E. Rowell

Outline of Instruction in Sheet Metal for Junior High Schools .. 19
F. E. Schneider

Book Binding, Repair and Rebinding 22
Chat. A. Picken

Editorial 26

An Interesting Group of Furniture 28
Don A. Sloan

Vocational Students Erect Gymnasium 31

PROBLEMS AND PROJECTS:

Skis 32
Chas. W. Frost

Skis and Ski Bending 32
Frank W. Dejmek

A Semi-Automatic Center Punch .. 33
Harry Moore

Stenciled Designs Applied in the Shop—III 33
Wm. B. Wright

Santa Claus Toy 34
H. J. Meyer

A Combination Book-and-Magazine Rack 35
Edwin M. Love

Die Stock 35
G. H. Snaddon

"Growler" for Armature Testing 36
B. B. Burling

A Jar Filling Funnel 37
Wm. X. Huber

Gravity Feed Match Box Holder .. 37
Carl H. Oquist

An Improved Butt-Joint Fastening 37
Chas. W. Frost

Manual Training Round Table, K. S. T. A., Hays, Kansas 38

Industrial Teachers Hold Convention 38

Boston Society of Vocational Education Meets 38

School Crafts Club Meeting 39

Now, Are There Any Questions? 40

News Notes 20a

New Books 29a

Publications Received 30a

Buyers' News 34a

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This is the season of the year when we turn aside from the burdens of our daily tasks to give thought for the welfare of others. The spirit of peace and good-will towards all mankind mellows our sordid tendencies into unselfishness.

The editors of the INDUSTRIAL-ARTS MAGAZINE are just every day human mortals, but they are as susceptible to all the finer impulses that go with the holiday season.

They wish our readers — each and everyone — all the blessings and compensations that can reasonably come within the reach of man. May the Christmas season be a merry one! May the New Year have in store for you physical well-being, mental contentment, and all the prosperity that your heart can desire. This is our greeting, our prayer, our sincere wish.

THE EDITORS.

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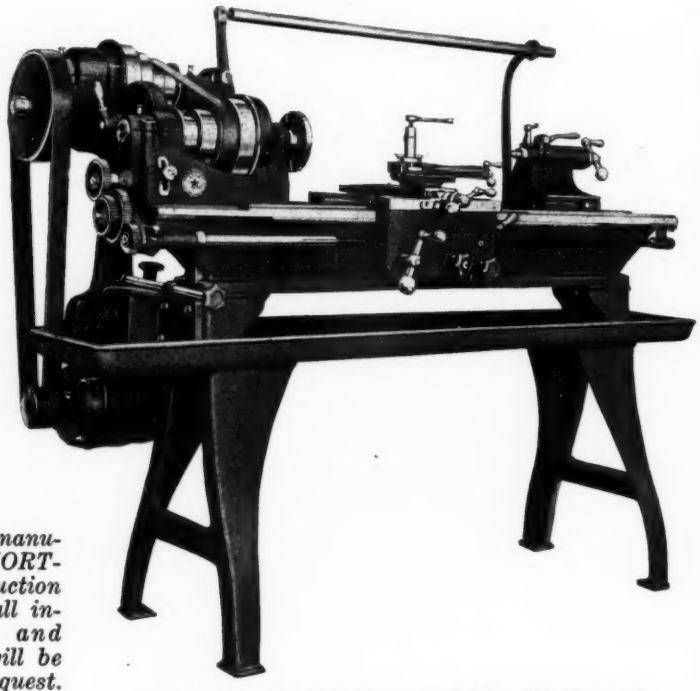

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THE INDUSTRIAL ARTS MAGAZINE

Volume XIV JANUARY, 1925 No. 1

Greater Educational Returns from Industrial Arts in the Junior High School*

Robert H. Rodgers, Division of Vocational Teacher Training, Milwaukee Vocational School.

I. Introduction

THE DEVELOPMENT of the subject under discussion gives specific consideration to four phases of the problem: (1) what is being done in manual or industrial arts in the junior high school at the present time; (2) the development of the junior high school movement and its demands upon the industrial arts; (3) organizing the industrial arts to assist in the accomplishment of the objectives of the junior high school; (4) the results that should be obtained under the proposed organization.

II. The Present Form of Industrial Arts in the Junior High School

A brief study of the industrial or manual arts in the state of Wisconsin, or in any other state, discloses that all schools offering work in this field have courses in wood-working or cabinet-making and some form of mechanical drawing. In some few communities will be found a second course, or possibly a third one, which may be machine shop, electrical work, automobile repairing, sheet metal work, or printing. Whatever the course or courses may be, it is apparent that they are not vocational education in that they do not prepare for a specific trade, nor may they be considered as a broad form of general industrial education. This may be verified by a scrutiny of the actual teaching content. It will be found that wood-working consists of a certain number of more or less formal projects followed by elective projects. The benefits received by the pupil are a meager experience with a certain few of the total and constructive processes and operations, a little mechanical drawing and some selected information concerning different kinds of woods, lumbering, tools and equipment.

Approximately the same general sort of practical experience and information is offered in all the manual or industrial art subjects. Research studies that have been conducted show a considerable variance in the statement of objectives and the points of emphasis. Edgerton, in his recent study of 303 intermediate and junior high schools, found that thirty-nine per cent of the schools stated their objectives are general experience, all-round development, and industrial intelligence. Thirty-three per cent stated their objectives are assisting in the intelligent selection of an industrial occupation without encouraging early choices. Twenty-six per cent are placing the emphasis upon enriching the school experiences of the pupil through concrete situations, while two per cent stress preparation for entrance into industrial vocations.

It is quite apparent from this very brief survey that it is most timely to be alert to the next moves that will result in greater educational returns from industrial arts in the junior high school. The question may well be asked, Is the industrial arts work developing in accord with the commonly accepted and recognized objectives of the on-coming junior high school movement?

III. The Junior High School and Its Demands Upon the Industrial Arts

The junior high school is steadily developing, and with its growth is coming a more general agreement upon objectives and administrative procedure. School administrators very generally accept vocational and educational guidance as one of the major objectives of this type of school. It is gradually being recognized that the industrial arts have certain vocational guidance values provided the fields of work are properly selected and effectively organized. A very hopeful indication is that there is general recognition on the part of the school administrator that the older aims and, in many instances, the present practices in the shops and drawing rooms do not fulfil the objectives. This situation is presenting a real challenge to teachers and supervisors of the industrial arts. The problem is squarely before us, how shall it be attacked and organized to secure the greatest possible vocational guidance returns?

IV. Organizing the Industrial Arts to Assist in the Accomplishment of the Objectives

Accepting vocational guidance as one of the objectives of the junior high school and also the fact that the industrial arts subjects are the most practical agency for securing its accomplishment, the first step in the problem may well be a closer analysis of the objectives.

The purposes of industrial arts have been presented in many different ways; but, in this discussion, they will be considered as follows:

1. To provide a practical form of vocational and educational guidance in specific occupations or groups of occupations.

*Given at the annual meeting of the Wisconsin Teachers' Association.

2. To provide a virile form of educational work that will appeal to and interest large groups of pupils at the period of adolescence.

3. To provide a limited amount of skill and information pertaining to the more important skilled occupations through the use of fundamental tools and selected constructive processes.

4. To provide through the industrial activities an opportunity to acquaint the pupil with various types of materials, equipment, and the scientific and economic facts pertaining to the industrial field.

5. To provide through the vocational activities a vitalizing agency for the less interesting and more abstract academic subjects.

A study of the above objectives shows that they are comprehensive, that they retain all of the better elements of a well planned program for the industrial arts, and that they also include the vocational guidance aspects. The aim in connection with this objective is to insure its becoming a direct product of the instruction rather than a mere superficial by-product. The next step in the discussion should be the scaling or the evaluating of the industrial arts work as found in most communities against the submitted objectives. The results of the evaluation are evident without an extended analysis—the vocational guidance elements are not being effectively incorporated into the instruction. The question immediately arises, Is it possible to give effective vocational guidance with the present organization of the work, or is it necessary to reshape it, and, if so, what is involved?

It seems wise, before proceeding further, to state certain facts that may assist in determining the form of organization:

1. Vocational guidance of the greatest benefit to the individual is that guidance given through a series of controlled practical experiences, on practical jobs, drawn from a wide range of occupational activities.

2. Eleven million men in the United States are engaged in the manufacturing and mechanical pursuits. Of this number, seventy per cent are employed in seven large occupational or trade groupings, as follows:

Metal trades
Building trades
Textile trades
Lumber and furniture industries
Food trades
Shoe and leather trades
Printing and publishing

The significance of the first statement is that it is desirable to make every effort to organize the industrial arts on the basis of desirable practical experiences that have been carefully selected so as to offer instruction of real vocational guidance worth. The second statement implies that in any program of industrial arts consideration may well be given to organizing instructional material about the trade or occupational groupings.

The above figures have been taken from the United States as a whole. Information pertaining to the state of Wisconsin discloses practically a similar situation as far as numbers are concerned, so full value should be given to the statistical data. These facts mean that the majority of communities will not make a mistake in developing the industrial arts about the building trades group and the metal trades group. The organization procedure may best be illustrated by taking the building trades group as an example. In the building trades are carpentry, painting and decorating, house wiring, plumbing, masonry, contracting, and architecture. A shop would be planned and equipped to offer practical instruction on type jobs in carpentery, inside wiring, painting and decorating, and elementary architectural drafting, while instruction in subjects of a vocational guidance value would be offered in all seven of the activities. It is believed that where students work on practical work in the building trades, it is exceedingly timely to study the entire field.

A shop must be equipped to offer practical instruction in carpentry, house wiring, painting and decorating, and the drawing, and provision must also be made for study and the preparation of notes and reports. Shops organized on the same general plan for the metal trades, electrical trades, automobile trades, printing trades, and others should be considered for cities of varying populations. If a community is able only to conduct a one shop program, it is probably most desirable to develop it about the building trades, or possibly on a composite plan of some activities in the building trades and some in the metal trades. This latter type of shop presents many teaching problems and can only be successfully operated with a very efficient instructor.

The nature of the vocational guidance subject matter that parallels the practical work is worthy of some attention. Its general nature should be economic in character. Problems for discussion and solution may profitably dwell upon the following:

1. Function of the Occupation.
   - Relation of the specific occupation to the other trades in the trade group.
2. Importance of the Occupation.
   - Numerical place the occupation fills, locally and nationally.
   - Value of product turned out locally and nationally.
   - Comparisons with other occupations—use graphs.
3. Conditions of Employment.
   - Mental and physical strains involved in the daily routine of work.
   - Specialization and its effect on the worker.
   - Conditions involved that must be taken account of; tools, machines, appliances, riggings, scaffoldings, etc.
   - Legislation pertaining to safeguards.
4. Hygiene of the Occupation.
   - Ventilation and its relation to the health of the worker.
   - Fumes, dusts, acids, poisons, and their effect on the health of the worker.
5. Economic Conditions.

Hours and wages of the occupation.
Average number of working days and income per year.
Average period of earning ability.
Comparison with other occupations.
Profit sharing, insurance, and pension provisions.
Legislation pertaining to hours and wages.
Evolution of labor and industry.

6. Entrance to the Occupation.
   Age at which the occupation is usually entered.
   Various ways of entering.
   Apprenticeship and conditions the learner encounters.
   Legislation pertaining to apprenticeship.
7. Demand for Labor.
   Relation between supply and demand.
   Factors influencing the labor market.
   Ratio between the number of workers in the specified occupation and other related trades.
8. Mental and Physical Requisites for Efficiency in the Occupation.
   Character of education, training, and experience needed for success.
   Personality, attitudes, and aptitudes requisite for success.
   Importance of good health, hearing, eyesight, and mental and physical alertness.
9. Opportunities for Advancement.
   Lines of promotion within the trade or industry and the rewards and responsibilities accompanying them.
   Trade and technical requirements for advancement.
   Personality, attitudes, and aptitudes contributing to promotion.

It is very readily apparent that in order to offer counsel and assistance of real value to pupils the teacher must possess the factual material pertaining to the above economic phases.

Summarizing the general plan of organization for the industrial arts in the junior high schools of cities of varying population, it seems desirable to present the following suggestions:

1. For a large city with three or more shops:

Seventh grade. Home mechanics with its accompanying related problems and general vocational guidance instruction that will provide an overlook of all occupations.

Eighth grade. Instruction in selected building trades with its accompanying work in related problems and the vocational guidance information pertaining to the entire group.

Ninth grade. Instruction in selected metal trades with its accompanying work in related problems and the vocational guidance information pertaining to the entire group.

2. For a small city with two shops:

Seventh grade. Home mechanics as above.

Eighth and ninth grades. Instruction in selected building and metal trades in a composite shop with the accompanying work in related problems and the vocational guidance information pertaining to all the trades of both groups.

3. For a small community with one shop:

Seventh, eighth, and ninth grades. Instruction in selected building and metal trades, or in other combinations, in a composite shop under the conditions stated above.

Shops organized on the group basis will present many special teaching difficulties. A variety of activities will be in operation in the shop at the same time, which means careful routing of students and planning of procedure, group and individual demonstrations and instruction, the preparation of innumerable instruction sheets, the close checking and recording of accomplishments, and the maintaining of a high standard in the upkeep of the shop.

The effective development of a program of industrial arts around selected groups of trades is largely one of individual instruction. This will require a large amount of teaching material organized in uit form, so that individual pupils may make progress as rapidly as they are able. The vocational guidance material may well be conducted upon the class basis, because the information is common to all and the units are not necessarily dependent upon each other.

V. Summary of the Problem

Summarizing the problem that has been presented, it is keenly felt that the plan intelligently developed and placed in operation will serve to broaden and enrich industrial arts in the junior high school, and thereby more nearly fulfil the objectives of that type of educational institution.

A detailed summarization of the discussion presents the following:

1. Vocational guidance of the greatest benefit to the individual is that guidance given through a series of controlled practical experiences, on selected jobs, drawn from a wide range of occupational activities.

2. The organization of instructional material and the equipment of shops on the trade group basis affords the greatest possible opportunity to offer selected experience in a wide variety of occupations.

3. The organization of courses of instructional content should be around the practical jobs, the related information, and the vocational guidance material.

4. Instruction organized on a trade group basis means a variety of occupational activities carried on within one shop and under the direction of one teacher.

5. A variety of occupational activities for industrial arts students in one shop necessitates making the instruction almost entirely individual in character.

6. Individual instruction in the composite shop requires the use of job instruction sheets to supplement the work of the teacher.

7. Instruction sheets should be so organized as to specify a definite job to be done with its accompanying related and vocational guidance subject matter. Sheets should, in all cases, be prepared in a manner to call forth the greatest amount of individual effort on the part of the student.

8. Finally, this type of organization will make it possible to offer a very practical form of vocational guidance instruction and will make guidance a direct product rather than a by-product.

Britannia Metal– x

The Decoration of Britannia

Professor William H. Varnum, University of Wisconsin

"And also, the good folks of the craft have agreed that no one shall be so daring as to work at night upon articles of pewter, seeing that they have regard among themselves to the fact that the sight is not so profitable by night or so certain as by day,—to the common profit."—From Ordinances of the Pewterers, A. D. 1348.

OBVIOUSLY, this regulation quoted from the Ordinances of the Pewterers was intended to foster a genuine spirit for honest workmanship and highest attainments within the ranks of the Guild of Pewterers and severe penalities were attached to this and other similar regulations. If a workman violated certain rules three times the pewterers cast him out of the trade: "He shall be fornized of the craft forevermore."

In addition to their high standards these old pewterers must have been hard workers; for in the ancient "statutes of the streets against annoyances," it was enjoined that "no hammerman, as a smith, a pewterer, a founder, and all artificers making great sound, shall work after the hour of nine at night, nor afore the hour of four in the morning, under pain of three shil. foure pence." At that time this was a large fine for untimely diligence.

Striving for real attainment of beauty as well as in materials and workmanship, it is of value to see the manner in which the pewterer treated the ornamentation of his work. Pewter was intended to withstand hard use, hence the pewterers understood the truth of modern design; namely, the less extraneous decoration, the longer the goods will last. Well designed, strictly utilitarian pewter and britannia should have its decorative emphasis centered in correctness of proportion, fineness, subtlety or robustness of its contour curves, pleasing texture of the surface, and obvious adaptation to use. Whatever ornament is used must be closely related to the contours, almost architectural in its simplicity, with a distinct freedom from the highly modeled and sculpturesque treatment.

ILLUSTRATION 1.

There is a natural integrity and honesty about nicely textured plain surfaces with a beauty of their own which cannot rashly be altered, a beauty one feels so clearly personified and symbolized in the creed of the old pewterers. We should treat our plain surfaces with marked respect, reducing them with emery and oil to an even, satin-like texture pleasing to the touch, or if warranted by the processes, with unaggressive tool marks. To me it seems a sacrilege to unmercifully hammer a good surface full of bumps with the sharp end of the ball and pein hammer under the guise of "tooling" that surface.

ILLUSTRATION 2. PAUL REVERE CUP.
(Courtesy of Boston Museum of Fine Arts.)

The decoration of pewter was begun prior to the first part of the Fourteenth Century, but by a band of craftsmen independent of the pewterers. It becomes apparent that as these men were not concerned with the design and production of the original forms, they failed to enter into the decorative spirit in which the metal should be treated.

Finally, we find the pewterers in control of all

phases of their craft, with the decoration showing a sense of fitness, a subordination to the form of the ware and a sympathy; all of which accompany good design.

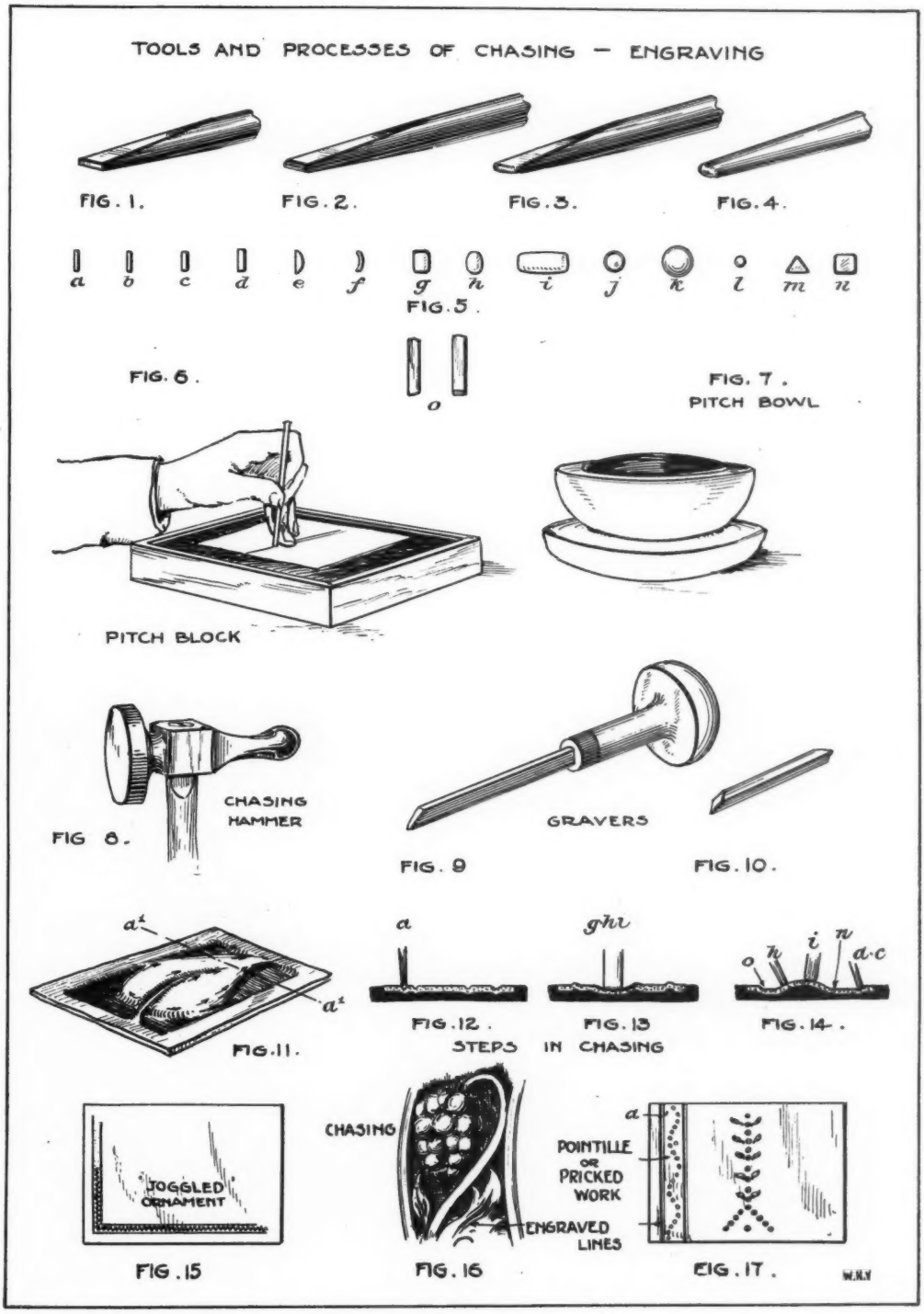


PLATE 1. CHASING AND ENGRAVING.

While the processes about to be described are interesting, they do not have equally interesting esthetic value.

One of the simplest forms of enrichment was carried out with a conically shaped tool resembling a center punch which was forced vertically into the metal in a series of dots. Frequently these took the form of an S curve for a border, Plate 1, Figure 17a. This "pricked ornament" depended for its richness on carved lines binding it into unity. Sometimes we find the

pricker supplanted by stamps of various shapes, occasionally flat on one side and serrated on the other. Stamped in a continuous series, this tool produced a border-like plan of enrichment.

Chasing—or as the French term it, repousse—was found on pewter, but the housewife's polishing mixtures of ashes or powdered brick had a way of destroying the highly modeled or relieved parts of the design. Moreover, deep grooves had a tendency to weaken the design, consequently shallow modeling in chased treatment controlled the motives of the best designers. Frequently the bases, lids, and even bodies of tankards and coffee pots were decorated with diagonal fluting. When one-third of the body is covered with vertical fluting, the effect is pleasing as one can see in the cup of Illustration 1. While this is of silver, by imagining a simpler fluting necessary for pewter, one can readily picture the effect.

Considering the fact that as a form of pewter

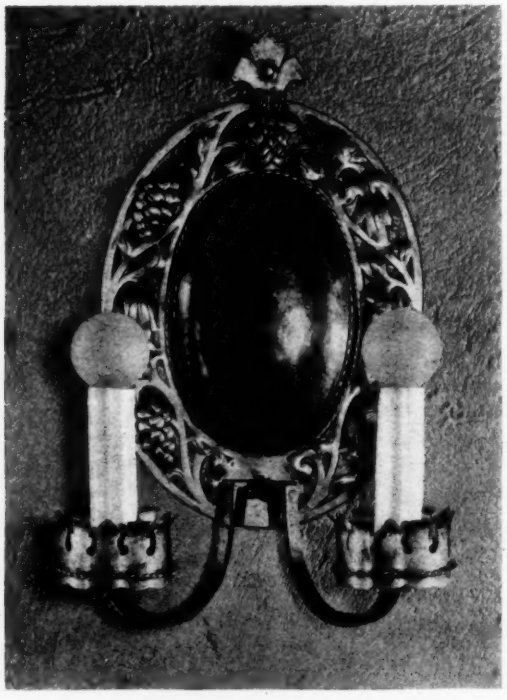


ILLUSTRATION 3.
(Courtesy of Kantack, Heath and Warman, New York City.)

enrichment, engraving, by actually removing the metal, weakens its construction, one can realize the care with which the pewterer approached the process. Used as a means of accenting chasing, engraving has its place, as will be shown later on. A form of engraving called "joggled" or "wriggled" work produced a series of small zig-zag cuts varying with the width of the graver and the pressure or speed of travel. This form is clearly seen in Illustration 2, a silver cup by Paul Revere. Every one knows of Revere's midnight ride; few know him as one of our best and earliest silver workers. While this cup is made of silver, its superb contours and correct subordination of enrichment to form make it well worth studying. The jogged ornament on the cup is well handled, but the beginner should reserve this for future experimentation.

As a rule, mouldings in britannia should be kept simple and flat, avoiding sharp edges and projecting angles. Correctly treated, they form one of the most attractive and suitable methods of enrichment. Among other forms of pewter enrichment may be mentioned inlaying with copper, gilding, silvering, lacquering, but of little value in that they cover the attractiveness of the metal; it is like covering mahogany with white enamel. Some of these inconsistencies were so marked as to cause the ban of the Pewterers' Guild to rest upon them.

For school practice, I believe chasing to be one of the most educative of the decorative processes applied to britannia. The art of engraving requires long practice while its results on britannia hardly justify this amount of application. Joggling, as later described, and pointelle (pricked work) require the treatment of experienced designers to save them from appearing spotty.

Plasticine, or clay modeling, of low relief ornament should precede work in chasing, thus acquainting the student with the possibilties of the art and supplying a background of information with which the constructive imagination may function. Use chasing with reserve, relying upon the decorative values in plain, unenriched surfaces. Study the modern side wall bracket or fixture of Illustration 3. As a project of this character receives little wear, chasing is justified, limited as it is in extent and balanced by a large undecorated utilitarian reflector.

Before advancing to the design of our project, it is imperative to understand the limitations of the chasing process which leads us to its tools and technique. Chasing tools are simple and easily constructed in the art metal shop by the pupil, thus lending greater educational value to the work and a saving in money. Certain complex matting tools are beyond the average pupil's capacity, but are used only on advanced problems.

Chasing, as applied to britannia, is a matter of low relief, achieved by three steps: (1) outlining the design; (2) modeling or punching up the more prominent raised portions from the back of the metal; and (3) finishing all surfaces from the front. For this purpose a number of either tool steel or brass tools are used with their working ends, highly polished surfaces of various shapes, acting as punches, to raise or depress the metal.

For most of the tools used to start the work, round stock from 1/8" to 3/16" in diameter, cut 4" long is suitable. Mr. A. F. Payne divides chasing tools into four groups: "Tracers, straight and curved, that are used to make lines; planishers of numerous shapes and sizes used to beat down the background and for modeling; matts similar in shape to planishers but with

matted or grained surfaces which are transferred to the metal when the tools are used; beads, rosettes and special tools." The stock to which I have referred is to the requisite form, acts admirably on britannia and without marring its surface.

Figures 1, 2 and 3, Plate 1, show steps leading

CHASING AND ENGRAVING
FIG. 3.
FIG. 1. CHASED ENRICHMENT MODELED INTO PERFECT UNITY WITH THE SURFACE
E HANSEN DES
FIG. 4. A WORKING DESIGN
FIG. 2. COVER OF FIGURE 1 REVERSED
FIG. 5.
SKETCHES
FIG. 6.
FIG. 7. A PAUL REVERE SILVER PITCHER WITH ENGRAVED DECORATION (COURTESY BOSTON MUSEUM OF FINE ARTS)
FIG. 8. NOTE 'DETACHED' APPEARANCE OF MECHANICAL PROCESS

PLATE 2. SURFACE ENRICHMENT.

adapted to the major portion of the tools, while stock rectangular in section and in some cases round (Plate 1, Figure 5), is necessary. For raising or modeling large areas, I find hard maple, smoothed and polished toward the formation of a tracer or outlining tool. The first figure shows the stock squared and tapered; Figure 2, the addition of a slight bevel around the end, while Figure 3 illustrates the tool as fully rounded, all

sharp edges removed with the slightest of curves from left to right, finally to be polished to the highest degree with fine emery cloth, oil and the tripoli buff. If these tools are of steel, temper them to a light straw color, although for britannia this step is not wholly necessary.

Figure 4 is an elliptically shaped tool, slightly flat on its working surface which acts as a planisher; much work may be accomplished with these tools and the average time for making them is fifteen minutes each. For outlining curved contours, the curved tracer, Figure 5f, is useful; A, b, c, and d are tracers of various widths; k and l are ball-shaped or doming punches; o is used for beating down backgrounds while the rest are useful both for modeling from the back of the metal and for planishing.

During the chasing process, britannia is secured to what is known as a pitch block or pitch pan. Pitch is a compound of Burgundy pitch, tallow and plaster of paris, preferably purchased prepared from dealers. The sheet of britannia is placed on the pitch black and heated gently with a bunsen burner. Using a stick of wood, bring all parts into contact with the pitch compound, testing the contact with light blows; if any part sounds hollow, reheat and remedy the defect. For small work, the pitch bowl of Figure 7, Plate 1, with its leather supporting pad, is useful. It may be purchased from dealers or made readily with the use of the chemist's sand bath bowl and a sand bag. One may turn these bowls in any desired position and thus aid in the manipulation of the work. Before attaching to the pitch, oil the bottom of the metal which will aid in its subsequent release.

As a substitute for pitch, I have used American modeling wax and found it to work well in cold weather. This wax may be melted and poured into a small baking dish three or four inches deep; save the wax by filling the bottom of the pan with small pieces of brick.

To transfer the design to the metal, work over the metal surface with fine pumice stone using a circular or spiral motion, thus raising a slight "tooth" on the metal. Securing the design to the metal by small balls of wax, slip a fresh sheet of carbon paper under the design and with a sharp, hard pencil trace the pattern carefully; for much of the spirit is often lost in the transfer. With a scratch point, mark the carbon lines securely *but lightly* on the britannia. Many prefer to coat the surface of the britannia with engravers' white or whiting and water, thus giving a dead white surface upon which to transfer the pattern.

Again consulting Figure 6, of Plate 1, the proper method of holding the chasing tool is seen to be as follows: The thumb and first two fingers hold the tool, while the hand supported on the fourth and little fingers act as a pivot; the tool is tipped slightly back. Figure 8 shows the light chasing hammer for which a two ounce ball and pein hammer may be substituted.

Turn the work until the line to be traced points toward the worker; place the slightly tipped tracer on the line, and strike with a light blow on its upturned end. Without conscious effort upon the part of the worker, the tool should move slightly forward, leaving a smooth, even groove. Repeat the blow, constantly keeping the tool in contact with the work. If for any reason one has to remove the tracer, resume work a short distance back. A correctly formed groove or outline should be true, decisive and (except under a magnifying glass) be free from dents. Corners may be turned by rotating the tracer or by the use of the curved tracer. With practice, one may form the outline in one operation, although the beginner should work over the lines several times, strengthening and correcting the contours. Figure 12 is of a cross section taken on the line 'a-a' Figure 11.

The main objective in outlining is to define the design on the reverse side of the metal, at the same time depressing the background or field of the design. To prove this, warm the metal slightly and remove from the pitch or wax. After cleaning with kerosene, in which pitch is soluble, or removing the wax with benzene, inspection will show a delicately outlined pattern on the back of the metal. Retaining the reverse side of the metal uppermost, return to the pitch block, and proceed to model the design with light blows, "coaxing" rather than forcing the metal into relief, using the largest possible tools which will fit the surface to be raised. Keep these tools constantly in motion and in contact with the work. Figure 13 shows the process with suggestions as to some of the tools used. Little raising of the background should be attempted, with all of the modeling working to a climax at the center of interest in the design.

Referring to Plate 2, Figure 2, I have illustrated the reverse of the cover of Figure 1. This is beginner's work in chasing and some of the errors common to starting are well illustrated. Modeling from the back should be free from dents and tool marks. In Figure 2, tool dents are observed upon some of the leaf forms but as skill in manipulation appeared, these dents disappeared and the smooth even modeling of planes is apparent. Judgment in selecting correct tools will simplify this process. For example, the berries are raised by the use of tool L, Figure 5.

When the back modeling has been completed, remove the plate, clean thoroughly; fill in the highest projections with melted chips of pitch or wax, return to the pitch block, and finish with the planishers. Figure 14 shows some of the tools used at the cross section indicated, while Figure 11 illustrates their direction. The idea is to make the design *grow out of the background* in modeled planes; hold and move the tools as in outlining, planishing in steady, even strokes as far as possible, paralleling the contours or at least working in sympathy with them. With flat tools, beat down the background and soften the edges until no trace of the original outline remains. Tiny bands of planished

modeling will give character to the work and texture to the surface. Remember that as in modeling, chasing must have the appearance of belonging to the surface from which it springs, rather than the "stuck on and stamped out" effect so often associated with mechanical stamping and embossing. Figure 8, Plate Z, shows this mechanical effect; contrasted with Figure 1 it proves the latter to possess many more artistic attributes.

Let me reiterate my statement with reference to over-high modeling: It has no place in britannia decoration and by minimizing rather than accenting the back modeling, success in this respect will be more nearly secured. The result is bound to be higher than the beginner anticipates. Background treatment may be made less mechanical by tiny tool marks as in Figure 3, Plate 2, or Illustration 3 treatment, in which the matting tool has played its part. In the latter design, accentuation is supplied by details carved in the leaves with the graver.

This brings us to the last suggested process, that of engraving. It should be used with extreme reserve; for, unless cleverly used, it fails to harmonize with the chasing. Figures 9 and 10, of Plate 1, are gravers supplied with long handles. Gravers are named in catalogs to accord with the shapes of their cutting surfaces, being square, flat, round, pointed, lozenge, diamond, oval, knife, or bevel as the case may be. A Vautier graver No. 56, round; No. 2 bevel; No. 4 square and No. 5 flat will be sufficient for beginners' uses.

Unless the graver is sharp, it will slip and mar the work. By trying the cutting edge on the nail of one's hand its degree of sharpness is ascertained; for it should not slip across the nail. Quoting Hasluck: "The method of holding the graver is as follows: Take it in the right hand, with the handle on the palm, grasping firmly with the forefinger and thumb. Hold the work with the second, third and fourth fingers and thumb of the left hand. The first finger should be at liberty to place in front of the thumb of the right hand to prevent the graver slipping.

"The hand, not the arm, is used to propel the graver, the length of the stroke rarely exceeding an inch. When the length of the cut exceeds the length of the stroke, the thumb is moved forward and replanted firmly on the plate. The graver is drawn back by the muscles of the hand, the point placed in the cut, and another forward stroke is made."

If the hand is raised too high, the graver will "dig in" while the lowered hand will cause the tool to slip out of the metal; frequently a convenient method of terminating a cut is used as shown in the leaf veinings of Illustration 3, and detailed on Plate 1, Figure 16.

The "joggled line" decoration of Figure 15, Plate 1, is made by rotating the round graver of Figure 9 with a twisting of the wrist, at the same time applying a slight forward pressure, seen in the additional example of Figure 7, Plate 2.

I feel that outside of purely utilitarian factors, engraving is better fitted to silver than to the softer britannia. To feel this adequately study the beautiful, finely, engraved Colonial pitcher of Figure 7, Plate 2, with Figure 1 of the same plate. Is it not felt that bolder chasing is better adapted to the character of the metal and engraving used merely for supporting pricked work or engraving small details and accents?

A One-Year Course in Farm Shop Work

D. W. Hamilton, Professor of Agricultural Education, State College of Washington, Pullman.

I. Introduction

THE ultimate aim of the *farm shop work* is to have every boy in the course have a shop of some kind at home; to have in that shop the necessary tools to do the farm construction and repair work; to have a work bench to facilitate the use of the tools; to have the tools conveniently placed and arranged in the shop; to have each boy know how to get and keep the tools in good working order; to see the boys masters of the tool operations; to have all the boys know how to make and read plans of buildings and farm appliances, and how to use the plans to construct the buildings and appliances; to develop sufficient general *judgment* and *skill* in the use of the tools; to do the ordinary construction and repair work which arises on the farm."—Prof. L. M. Roehl, Cornell University.

All shop work should be taught by the project method. Woodwork, in particular, lends itself readily to project work on a productive basis. Farm life calls for considerable project or job work of a constructive nature; it also demands much reconstruction or repair work in wood, iron, sheet metal, leather, rope, etc. The building of a poultry or hog building is an example of a major construction project. Making a halter, tool box, or punch is a minor project or job. Even a repair item is *popularly* called a job.

It will be noticed that most farm shop projects or jobs are closely correlated with one or more farm enterprises. The *enterprise of poultry raising* may demand the construction of feed hoppers, trap nests, brooder, etc. The ideal is to have the farm shop work parallel the more strictly agricultural phases of the vocational agriculture courses; e. g., the shop work in farm machinery should parallel a farm crops course. Where one year only of general farm shop work is given, poultry projects, for example, might be undertaken when poultry problems are most seasonal.

One aim of farm shop work is to have boys acquire knowledges and skills in the upkeep of tools commonly found on the farm, including sharpening, adjusting,

and caring for tools. These skills may be acquired in connection with the construction or repair work of the course. No doubt there are some tool operations; e. g., filing a saw, which call for specific instructions and practice.

As suggested by the title of the course—*farm shop*—the shop or laboratory should be the place of instruction at school and demonstrations and practicums the principal means of instruction. Some theoretical problems may be solved in recitations. The work should be closely correlated with the farm needs and interests of the pupils. Each boy should undertake farm shop jobs, projects and repair exercises at home; and, as far as possible, provide for a properly equipped farm work shop—the ideal for every farm.

It is suggested that rope, leather, sheet metal, and forge work constitute the course of the autumn semester; that the second semester be given to wood and concrete work which are closely correlated.

II. The Need for Farm Shop Courses

1. A large percentage of the farmers commonly do construction or repair work in wood, iron, sheet metal, concrete, leather and rope.

2. The development of skills and knowledges along these lines seems necessary in successful farm work.

3. Opportunities for the acquirement of these knowledges and skills are not otherwise provided for in high school courses, except for certain phases in some manual training courses.

4. Opportunities for instruction of boys at home or on farms are usually limited.

Note. These statements relative to the need for farm shop courses in the high school apply particularly to work in wood, iron, sheet metal, concrete, leather and rope. Plumbing (except ordinary water-pipe fitting) and electric wiring are not often done by farmers. In order to satisfy the demand of underwriters and of sanitary regulations in many towns and cities, plumbing and electrical work must be done by skilled workmen.

III. Primary Factors Determining the Nature of a Farm Shop Course

1. The number of farmers in the community doing one or more kinds of farm shop work is determined by a local farm survey. (See returns from surveys in Washington and Minnesota.)

2. The frequency of these operations.

3. Availability of commercial shops.

4. Availability of teachers qualified to teach one or more phases of farm shop work.

5. Available or possible shop facilities at the school.

   a. Space in buildings.
   b. Equipment.
   c. Materials.
   d. Opportunities for construction work.

6. The natural interests of the pupils in one or more phases of shop work, as determined by a survey of their needs and interests.

7. The degree to which manual training work taken by the boys has functioned on the farms.

IV. Administration of Farm Shop Courses

1. By whom taught.

a. Depends on local conditions.

b. A teacher of vocational agriculture qualified to teach farm shop work is preferable.

c. A man especially qualified to teach farm shop work.

d. A manual training teacher with special qualifications, and the correct attitude toward farm shop work.

2. Where taught.

a. In an especially equipped farm shop at the school.

b. In a manual training department provided with special farm shop equipment.

c. In an industrial work shop, in city schools.

V. Methods of Instruction

1. Course based on analysis of construction and repair jobs.

2. The instruction to consist of actual shop work on a useful and productive basis.

3. Instruction closely connected with supervised practical work on the farm.

4. Emphasis on repair work.

5. Provisions for community service work, dependent upon local conditions.

6. Either individual or group instruction.

7. Sufficient mechanical drawing to enable a pupil to make a working drawing and to read a blueprint—to be taught in the unit where required; e. g., woodwork.

8. Shop to be provided with the best reference books on farm shop work.

VI. General Objectives of a Farm Shop Course

1. Development of skills in use of common tools.

2. Knowledge of methods and materials in shop work.

3. Ability to do common repair and construction work on the farm.

4. Recognition of the importance of independence in common repair and construction work on the farm.

5. Development of ideas of economy on the farm.

6. Provision for farm shop work on each farm.

7. To develop a useful "hobby" to occupy one's idle days.

VII. Fundamental Tool Operations

1. *Woodwork*

a. Measuring, marking, squaring, sawing, planing, boring, counter-sinking, shaving, chiseling, hewing, wood filing, scraping, plumbing, leveling, gluing, nailing, driving and drawing screws, tapering, mitering, mortising, and tenoning, beveling and chamfering, rounding, doweling, assembling, staining, shellacing, varnishing, waxing, filling, painting, etc.

b. Jointing, setting and filing crosscut and rip saws; grinding and whetting chisels and plane bits; grinding axes; filing an auger bit, etc.

c. Cutting glass, placing glass, using glaziers' points, puttying, etc.

2. *Concrete Work*

Making forms, mixing, placing, finishing.

3. *Metal Work*

a. Cold Iron.

Sawing, filing, center punching, drilling, threading, tapping, reaming, counter-sinking, banding, grinding, buffing.

b. Hot Iron.

Making and caring for fire, heating, bending, straightening, upsetting, drawing, squaring, punching, twisting, welding, annealing.

c. Riveting, bolting, chiseling, brazing.

4. *Sheet Metal Work*

Scraping, applying flux, operating torch, heating copper, tinning copper, applying solder, sweating in.

5. *Rope Work*

Relaying, making knots, fastening ends, making hitches and halters, braiding.

6. *Leather Work*

Washing and oiling, making a waxed-end, making a stitched splice, punching and riveting, lacing with wang, lacing with soft wire, using patent splice staples.

VIII. Farm Shop Projects Suggested by Farm Enterprises*

1. *Enterprise of Raising Cattle*

a. Feed rack—hay.
b. Silage cart.
c. Breeding rack.
d. Cooling tank for milk.
e. Dehorning chute.
f. Bull—staff.
g. Feed rack—grain.
h. Milk stool.
i. Stanchions.
j. Dairy record board.
k. Calf weaner.
l. Fence posts.

2. *Enterprise of Raising Horses*

a. Feed trough.
b. Scraper for cleaning floor.
c. Twitch.
d. Farm gate.

3. *Enterprise of Raising Hogs*

a. Hog hurdle.
b. Trough.
c. Self-feeder.
d. Breeding crate.
e. Hog rack for wagon.
f. Hog chute.
g. Hog waterer (concrete).
h. Feeding floor (concrete).
i. Individual farrowing shed.
j. Erecting hog tight fence.
k. Hog crate.
l. Hog wallow (concrete).
m. Dipping vat (concrete).
n. Division panels.
o. Community hog house (class).
p. Feeding rack.

4. *Enterprise of Raising Poultry*

a. Feed hopper.
(a) Chicks.
(b) Mature birds.
b. Coop and runway for hen and chicks.
c. Small colony home.
d. Trap nest.
e. Farm poultry house (class).
f. Poultry fence.
g. Brooder for chicks.
h. Creep for chicks.
i. Feeding troughs.
j. Egg candler.
k. Coop for broody hens.

5. *Enterprise of Raising Sheep*

a. Tying frame for wool.
b. Shearing table.
c. Butcher block.
d. Feed racks for hay.
e. Self-feeders (grain).
f. Trough.

6. *Enterprise of Bee Culture*

a. Bee hive.
b. Super.
c. Bee net.
d. Box base.
e. Hive stool.

7. *Enterprise—Farm Crops*

a. Hay rack.
b. Seed testers.
c. Wagon box.
d. Eveners, singletree, neckyoke.
e. Hay stackers—sweeps (class).
f. Marker (garden).
g. Potato grader.

8. *Horticulture*

a. Hot bed.
b. Cold frame.
c. Markers.
d. Dibbles.
e. Flats.
f. Ladders (fruit).
g. Sorting tables.
h. Apple packer.
i. Compost grinders.
j. Compost screens.
k. Soil packers.
l. Plant supports.

9. *Miscellaneous*

1. Wood.

a. Ironing board.
b. Fly trap.
c. Sack holder.
d. Wagon jack.
e. Bread board.
f. Broom holder.
g. Plant stand.
h. Wood box.
i. Wash bench.
j. Fireless cooker.
k. Bob sled.
l. Scoop board.
m. Wagon tongue.
n. Reach.
o. Garage (class).
p. Corn crib (class).
q. Saw horse.
r. Harness horse.
s. Iceless refrigerator.
t. Bench hook.
u. Bench stop.
v. Mallet.
w. Tool chest.
x. Work bench.
y. Tool rack.
z. Nail box.
z1. Hooks for various purposes.
z2. Work tables.
z3. Window screen.
z4. Wheelbarrow.

2. Iron.

a. Cold chisel.
b. Punch.
c. Chain links.
d. Thread bolts.

*Taken from a report of a Nebraska Committee on Farm Shop, 1920.

IX. Reference Books Recommended for Farm Shop Library

(Note. The numbers refer to the publishers.)

1. *Woodwork*
   - 1. Farm Woodwork, Roehl, 1919, $1.25.
   - 1. Agricultural Woodwork, Roehl, 1916, $1.00.
   - 1. Manual Training for Rural Schools, Roehl, 1922, 35c.
   - 2. Woodwork for Beginners, Griffith, 1919, 32c.
   - 2. Carpentry, Griffith, 1919, $1.50.
   - 2. Problems in Farm Woodwork, Blackburn, 1915, $1.75.
   - 3. Handy Farm Devices, Cobleigh, 1909, $1.50.
   - 8. Farm Structures, Ekblaw, 1919, $1.75.
2. *Metal Work*
   - 1. Practical Forging and Art Smithing, Googerty, 1920, $1.00.
   - 2. Farm Blacksmithing, Friese, 1921, $1.25.
   - 4. Forge Practice, Bacon and Markham, 1921.
   - 5. Brazing and Soldering, Hobart, 1920, 35c.
   - 5. Soldering and Brazing, Yates, 1920, 75c.
   - 8. Farm Blacksmithing, Drew, 1921, 75c.
   - 8. Blacksmithing and Forging, Moore, 1921, $2.00.
3. *Rope and Harness Work*
   - 1. Rope Work, Roehl, 1921, 80c.
   - 1. Harness Repairing, Roehl, 1921, $1.00.
4. *Concrete Work*
   - 1. Elementary Concrete Work, Baxter, 1920, $1.25.
   - 2. Practical Concrete Work, Campbell and Beyer, 1922, $1.35.
   - 4. Concrete Construction for Rural Communities, Seaton, $2.00.
   - 8. Farm Concrete, Ekblaw, 1919, $1.60.
5. *Combination Books*
   - 6. Farm Shop Work, Brace and Mayne, 1915.
   - 2. Farm Mechanics, Crawshaw and Lehmann, 1922, $2.00.
   - 3. Farm Conveniences and Farm Appliances.
   - 9. Shop Projects, Burton, 1915, $1.60.
   - 10. Blue Print Reading, Wyatt, 1920, $1.00.
   - 11. Construction and Repair Work for the Farm, Struck, 1923, $2.90.
   - 12. Engineering on the Farm, Stewart, 1923, $2.25.
   - 1. The Farmer's Shop Book, Roehl, 1923.
6. *Miscellaneous*
   - 1. Farm Shop Record Book, Roehl, 1922, 50c.
   - 7. Essentials in Mechanical Drawing, Smith, 1918, 60c.
   - — A book of Barn Plans, Loudon Machinery Co., Fairfield, Ia. (free).
   - 4. Practical Farm Drainage, Bowers and Teeters, 1922.
   - 5. Agricultural Drawing, French and Ives, $1.25.
   - 9. Equipment for Farm and Farmstead, Ransomer, 1917, $3.60.
   - 7. Rural Hygiene, Ogden.
   - 7. Electricity for the Farm, Anderson.
   - 2. Problems in Mechanical Drawing, Bennett, $1.20.
   - 4. Agricultural Drafting, Howe, 1919, $1.25.
7. *Farm Machinery and Motors*
   - 4. Farm Machinery Manual, West, 1918, $1.75.
   - 8. Agricultural Engineering, Davidson, 1919, $1.85.
   - 3. Farm Machinery and Farm Motors, Davidson and Chase, 1920.
   - 9. Farm Motors, Potter, 1917, $2.50.
   - 4. Automotive Repair, Wright, 1921; 2 vols., $3.00 each.
   - 8. Farm Machinery, Wirt, 1919, $1.25.
   - 10. Automobile Handbook, Dyke.
   - 4. Farm Gas Engines, Hirshfield and Ulbricht, $1.50.

X. Bulletins.

1. "The Use of Ropes and Tackle," Bul. No. 8, Engineering Experiment Station, Pullman, Wash.
2. "Rope Work," Bul. No. 136, University Farm, St. Paul, Minn.
3. "How to Make and Use Concrete," Bul. No. 1.
4. "Concrete Basements," Bul. No. 2.
5. "Concrete on the Dairy Farm," Bul. No. 3, Portland Cement Association, Seattle, Wash.
6. "Care of Leather Equipment," Militia Bureau.
7. "Handy Equipment for Swine Raising," Circular No. 69, Agr. Exp. Station, Ames, Iowa.
8. "A Movable Hog House," Bul. No. 85, Extension Service, Pullman, Wash.
9. "Hotbed Construction," Bul. No. 98, Extension Service, Pullman, Wash.
10. "The Repair of Farm Equipment," Farmers' Bul. No. 347, Washington, D. C.
11. "Laboratory Exercises in Farm Mechanics," Farmers' Bul. No. 638, Washington, D. C.

XI. Publishers of Farm Shop Books

1. The Bruce Publishing Co., Milwaukee, Wis.
2. Manual Arts Press, Peoria, Ill.
3. Orange, Judd Co., New York City.
4. John Wiley & Sons, New York City.
5. McGraw-Hill Book Co., New York City.
6. American Book Co., Chicago, Ill.
7. The Macmillan Co., New York City.
8. Webb Publishing Co., St. Paul, Minn.
9. Ginn & Co., Boston, Mass.
10. A. L. Dyke, Publishers, St. Louis, Mo.
11. Houghton Mifflin Co., Boston, Mass.
12. Rand McNally Co., Chicago, Ill.

XII. Units of a One-Year Course in Farm Shop

Unit I. Rope Work, one to two weeks.
Unit II. Leather Work, three to four weeks.
Unit III. Sheet Metal Work, two to three weeks.
Unit IV. Iron Work, nine to twelve weeks.
Unit V. Wood Work, ten to fifteen weeks.
Unit VI. Concrete Work, two to five weeks.

SOME OF THE POSTERS MADE BY MEMBERS OF THE CLASS.

Posters for Eighth Grade Pupils

Ora Strange Kilborn, East Orange, N. J.

ONE MORNING the art director on her round of visits found a departmental teacher and her four classes of eighth-grade pupils in a state of pleasant excitement concerning an entertainment, called the "Magic Lunar Circus," that was to be given by their school in the near future.

The departmental teacher was fully convinced that this was an auspicious time for the making of posters; but the prescribed course of study did not call for posters until six weeks later. When she voiced her conviction, the art director seized her educational broom, swept aside the course of study, and began to sweep with the wind.

There was a "felt need"; but, before work was started, a consultation was held concerning possible methods of procedure. Pupils of this age are always interested in the "why" and "how" of things.

They were directed to consult the dictionary for a definition of poster and found that that authority pronounced it to be "an advertising sheet for pasting on a wall." Observation had already taught them that posters were sometimes found in other places; but this definition made them realize it was an advertising sheet and thus in the nature of the case its function was to give information or tell a story to the public.

Stories are told in various ways. Sometimes they are related by means of oral language, sometimes by written language or the printed page. They are often told by means of dramatic action and yet again are expressed through the medium of musical tone, either by means of the human voice or a musical instrument and, at times, stories come through pictures.

A poster is usually a combination of picture and the printed word.

Having found out that a poster must tell a story, the next question was how to proceed to make it do this. Under the teacher's guidance it became evident that decisions must be made concerning the following points:

I. Size

Twelve inches by eighteen inches was decided upon, this being considered a size large enough to carry a message and one that could be conveniently handled on the school desks.

II. Layout

1. *Margins.* One quarter inch at top and sides and half an inch at the bottom was determined upon. The small size of the poster led to the choice of this narrow margin.

Pupils had been previously taught that the apparent center is slightly above the actual center of a given space and thus realized they must provide a wider margin at the bottom if their design was to avoid the appearance of sliding towards the lower edge of the paper.

2. *Spacing.* Three choices were offered.

a. All lettering might be placed near the top and the remaining space reserved for decoration.

b. Lettering might be placed near the top and bottom and the space between utilized for decoration.

3. All lettering might be placed near the lower edge and the upper portion properly filled with decoration.

III. Lettering

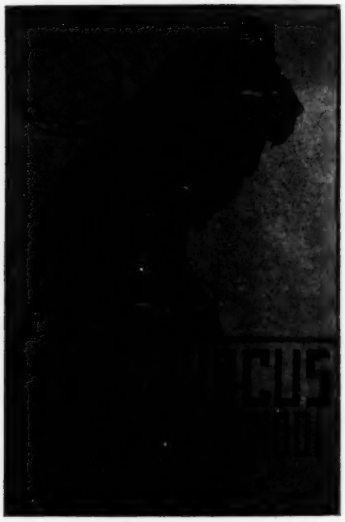
1. All lettering should be of such a character that it can be easily read.

2. Words must be large enough to be seen at a considerable distance.

3. All were agreed that the wording must tell the kind of entertainment and the name of the school giving it.

4. The size of the poster made it advisable to place all words on two lines although three lines might be allowed. Some decided upon "circus" with "Columbian School" on the line below. Others allowed two lines for "Magic Lunar Circus" and placed the name of the school on the third line.

5. Then came the question as to which should be made the most prominent. By unanimous consent it



A TYPICAL POSTER.

was voted that circus was the important word and thus should be the largest.

IV. Decoration

This should always be appropriate to the subject of the poster. In this case animals, animal cages, clowns, rings, circus poles and moons (since this was a "Lunar Circus") were all voted desirable.

As soon as this decision was made pupils began to collect pictures. It seemed that an unlimited number of desirable ones were to be found in circus books, in the advertisements of the daily papers and the current magazines. Hundreds were collected and everybody was allowed to make his own selection. Pupils realized their limitations and knew they would be unable to draw these to their satisfaction. They were delighted when told they might trace the animal of their choice, cut it out and use as a pattern to trace.

They were taught that the decoration, whatever its character, should always be made large enough to properly fill the space it occupies. If it is too small it will seem to float about, and if too large will appear crowded. No absolute rule can be laid down; but background spaces should be less than the objects placed upon them.

A conscious effort was made to arrange the principal animal or group so there would be a feeling of balance. The cut paper patterns were moved back and forth until there seemed to be an equal amount of weight at the left and right of the center. When a satisfactory arrangement had been secured the figures were traced. After the whole poster had been worked out on manila paper it was transferred to colored construction paper of the same size.

V. Color

Pupils were familiar with complimentary harmony and during the year had studied split compliments. This problem presented an opportunity to make use of these color schemes. Black and white were added according to individual choice. Colored construction paper was used for the background and this determined the color combination. The following list gives some of the chosen harmonies:

1. Background of neutral yellow orange paper with red, orange, blue and touches of black.
2. Neutral blue paper with orange, black and white.
3. Neutral green paper with masses of black and white and touches of neutral red.
4. Tan paper with combination of red, orange, yellow orange, and either black or white.

Tempera (opaque water color) was used and all letters and all parts of the decoration were filled in solidly.

When the poster was completed we paused to consider whether or not we had obtained the desired educational results. We were able to enumerate the following:

1. From the start interest had been aroused which did not lessen during the time allotted to the problem.
2. Through the presentation of an opportunity for individual selection of appropriate animals, pupils had been called upon to make a succession of choices. Thus the child's judgment had been trained; for judgment is the result of such processes.
3. The following principles of design were illustrated:
   a. Law of margins.
   b. Principality and subordination.
   c. Variety. This was secured by selecting different shapes and colors, and also by the use of unequal division of space. Such divisions avoid deadly monotony and give a feeling of satisfaction to the eye.
4. Proper relation of area of decoration to background spaces.
5. Harmony. This was secured by the choice of appropriate decoration and proper combinations of colors.
6. Balance. An equal amount of weight on either side of the center secured this.
7. The child's color perception had been increased.

To discriminate color and appreciate it one must work with it. No amount of oral language ever trained the eye to perceive, appreciate and enjoy the marvelous manifestations of color about us in the world in which we live.

While pupils were designing the posters, the teacher acted as guide; but when they had completed them they had gained sufficient knowledge to enable them to criticize their own work and determine whether it were good or bad.

Judicious questioning on the part of the teacher led them to the following conclusions: 1. A poster is good when it tells a story and tells it so quickly that "he who runs may read." 2. The posters that tell the best stories follow artistic principles.

The Value of Science in Vocational Education*

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INDUSTRIAL or vocational education is a natural development from industrial training. Formerly apprentices were trained in a trade by a process of imitation, by the trial and error method—errors on the part of the beginner and trials on the part of the journeyman in whose care the beginner may have been. There were few explanations, very few reasons given for certain methods, and, in fact, very little information of any kind presented to the apprentices in addition to a limited showing, a certain amount of rule-of-thumb methods. If the apprentice lived through the process he became an excellent journeyman, perhaps better prepared in his ability to perform the acts of his trade than many of the modern journeymen; but at a great loss of time in the training, on account of the lack of education to accompany the training. Moreover, this training was given to a limited few; today we have the problem of educating all who may apply, and training alone is insufficient if the schools are to function in an efficient manner.

We speak of the trained man and the educated man. Some of us place the trained man on a pedestal and others worship at the shrine of the educated man. As a matter of fact, a man who is only educated, or a man who is only trained, is but an incomplete product of modern civilization. Training enables a person to do only those things for which he has received definite training; he can do little else. He has acquired certain habits of action to such an extent that it is no longer necessary for him to *think* about his work. Many examples of a similar nature are to be found in our daily lives, such as the action involved in dressing, eating, walking, looking at the clock. Some such habits are very desirable, on account of the saving of thought; but if it is one's business and duty to think, then such habits are harmful. Nevertheless, in order to become a good operator of any machine, whether it is a machine devoted to industry or one devoted to music, a person must receive a certain amount of direct training, varying with the person and the kind of machine. If, however, this specific training is the only source of instruction, if the industrial worker is not *educated* in lines akin to his industry or the musician is not taught harmony, and all that forms a part of a musical education, neither the industrial worker nor the musician will be likely to become more than a part of his machine, nor will either rise to any great heights even in the field in which he has received his training. Education is necessary if the best is to be obtained from any person; we must see to it that each receives all that will help him to become a whole man, and we must demand the best expression from every man.

Education, on the other hand, may be as narrowing in its effects as is training. If education is pursued for the sake of storing up mental material, for the development of the power of thought and reason for the mere pleasure and satisfaction of the processes involved, it may become wholly detached from the life of the world as it functions in reality. A man who is educated in this manner lives in a little world of his own, shut off from the material world in which he has his physical being. Such a man is to be more pitied than the one who is only trained. The latter may accomplish much good; the former is helpless unless he can direct his education to some world activity, or to the furthering of general mental development. Just in so far as he directs his ability toward a practical goal, or devotes his attention to the advancement of human knowledge, he becomes better trained and more useful to society.

The Beginnings of Science

In the earliest times the philosophers, the wise men, were more concerned with attempting to show that all nature conformed with their theories of life and matter, than in accepting experimental proof. The rule of authority was established and brave was he who dared to express an idea differing from the accepted one.

With the rise of the experimental era came the search for the impossible—the touch-stone which would turn base metals to gold; the elixir of life which would produce eternal youth; various charms which might incur love or hate. While the objects were futile the results were of immense value; a growing knowledge of matter was obtained and many natural laws were established. With this increase of scientific learning came many practical applications and the civilization of the world advanced by leaps and bounds, with a constantly increasing acceleration. Yet this very ability of applying the discoveries of science to practical ends caused to arise in the minds of the people a lack of respect for, and a certain suspicion of, science unless it had a direct and immediate practical value. This attitude of mind was not without a reasonable foundation; for the teachers of science in our schools and universities have been prone to teach science for its own sake and not for its applications. Thus have developed pure science and applied science; one representing the continual search for the truth, the other in answer to a demand on the part of the people that the science work in the high school, at least in vocational education, be practical. As a matter of fact, there is no so-called pure science which does not have its practical applications, nor is there any so-called practical science which does not owe its very existence to the scientific search for the truth.

If the scientist, at any time, held as his goal the practical applications of his investigations he would be cramped and limited in his search for the complete truth by the great temptation to stop at various stages

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of his work and make side excursions to apply his discoveries in the furthering of industrial processes. If, on the other hand, his mind can be given entirely to a complete study of his problem, freed from any but scientific motives, the results will be greater and of more ultimate worth than if he were making the investigation for only its practical applications. Of course, the distinction must be made between scientists in general and industrial scientists; the latter have as their goal the direct investigation as it affects some phase of industry while the former are interested in the advancement of scientific knowledge. The industrial scientist, however, is usually one who has spent many years in scientific research before he applied himself to the industrial investigation.

The Research vs. the Practical Scientist

It must be remembered, in discussing the work of the research scientist, that many of our most important applications of science have grown out of the work of men who never thought of the practical aspect of their experiments. One example will suffice: In investigations on the electrical discharge through gases the Edison effect of ionic carriers, and the Fleming valve to produce undirectional current from alternating current were known for years before DeForrest recognized the possibilities and made the practical applications to radio. Now it is possible both to receive messages by means of the scientific discoveries of Fleming, and also, by a modification of the electrodes, to speak through space. In its other modifications we may relay the ordinary wire telephonic communication so that conversation across the United States is now a common occurrence; we may rectify large electric currents, and we may experiment with direct current of such a high tension that it could not otherwise be easily obtained. To whom is the credit due? Nothing could have been accomplished without Fleming's investigations; his discoveries lay fallow until DeForrest and others put them to a practical use. It took a master mind to prepare the tool; a master mind was required to use it.

The trouble between those who believe that science should be studied as science, and those who hold as their goal the practical applications of science, arises from the fact that much of the strictly scientific investigations are carried on in the universities by the same men who give instruction in science to the students. It is natural that these investigators should carry over into their classrooms and lecture rooms the ideals which they hold in regard to science, and thus the students, who later are to become the teachers of science in the high school, are imbued with the spirit of research, are interested in science for its own sake, and they, in turn, attempt to teach with the same ideals. A teacher nearly always teaches in the same manner as he himself was taught. The results have been disastrous, both to the students in the high school, most of whom will never study science after leaving school, and to science, since on account of this attitude of "science for science's sake," the natural but narrow and academic view of science teachers, the science courses in the high school have lost their grasp upon the minds and the imaginations of the pupils. More than that, science has become, perhaps, the most disliked study in the high school, as indicated by the tremendous falling off in the number of students who are taking *elective* science courses. There is no doubt but that science has been taught in a manner too purely scientific; no doubt but that its subject matter has been too much divorced from the activities of daily life.

Science in Vocational Education

When vocational education came to the forefront, stimulated by the passage of the Smith-Hughes law, science was considered of so much value to the industrial worker that the various states included it in their vocational courses of study. Immediately there was a demand that this science should be of direct value to the industry which a particular pupil was to study—a demand most certainly justified from previous experience with science courses and science teachers. Some states have even insisted that nothing should be taught the pupils except that which would have a direct bearing upon the shop work with which they were at that time engaged. Happily this narrow view of applied science has become enlarged; there still remains the reasonable requirement that the science courses shall contribute as fully as possible toward the production of a well rounded vocational education. This may be broadly interpreted in various ways: There is the direct application of scientific knowledge to industry, concerning the value of which there can be considerable discussion, and then there is the indirect value of science in developing a desirable attitude of mind toward the industry, and in creating a better social being of the worker in industry, manifested both in his work and in his social relations.

The facts and laws of science, as such, probably do not have a very great effect upon a pupil's ability to learn to do a particular job in the shops, with the possible exception of the electrical shop. To know about the kinds of trees from which lumber is made can not make a better craftsman of a carpenter; to understand the laws of capillarity, and the oxidation of linseed oil, can not increase the skill of the painter in handling a brush; a knowledge of the molecular constitution of matter can not make a better blacksmith; in fact, there is very little evidence to indicate that so far as the skill of a trade is concerned an industrial worker needs a knowledge of science. Long before science had won its modern recognition there were skilled workers in all the branches of industry.

Why, then, is science considered so essential to vocational education? The answer lies in the American ideals in education and in equal opportunity for all. We believe that every man shall have the education and the training which will fit him to rise in his trade or profession to a commanding position, and we demand that every man become sufficiently educated to take his place as an efficient social unit. If the man in industry

is to be considered only as part of the machinery, if the aim in industrial education is to so train the individual as to absorb his entity in a particular branch of industry, then, indeed, science can play no important part in industrial education. On the other hand, if industrial education has as its real goal to aid in moulding the individual so that he may become a more intelligent workman and an effective member of society, efficient in work, capable of rising in position, a person with a growing appreciation of the part to be played by him in the economic life of the community and the state, then science may serve as the most effective means for producing real industrial education.

Values of Science in Vocational Education

The direct value of science to industrial education lies in its ability to prepare the pupils to become foremen, shop superintendents and to establish themselves in business. Knowing the fundamental laws of science, having had brought to their attention innumerable applications of science to the various phases of industrial work, realizing the importance of science as a means of solving difficulties, recognizing the power a knowledge of science gives its possessor, the pupils are stimulated to enter upon their chosen field with a determination to win their way to the top. I believe that the intelligent pupil begins to change his point of view concerning industrial work as soon as he has had sufficient science to catch its spirit of service. The shop work becomes something more than a certain amount of training, it arises to the dignity of a step in the advancement of the pupil to a desirable position, not alone sought for increased pecuniary gain, but because it stands for recognition and responsibility.

With this criterion for selection, the direct values of science become very numerous; some of them may seem far afield unless American ideals are kept in view. Thus it is valuable to teach the laws of lighting, heating and ventilation; the laws of health and sanitation; a knowledge of the water supply is desirable. All of these have no direct and narrow bearing upon any one division of industry; but they all vitally affect industry as a whole. The laws of machines, of heat, of electricity should be taught; also the laws of force, energy and power, as manifested through the agency of solids, liquids and gases; impartially to all pupils, no matter what their shop work may be at the time they are taking the science work. There can be no science of a particular branch of industry; most certainly there is industrial science, broad in its scope, effective in its results.

It is not too strong a statement to make that all industry depends upon the applications of scientific principles. Of course this is not the same as saying that all of the workers in industry must know science in order to operate their machines, or to become operators of any sort; but it is certain that if the American ideal of equal opportunities for all is to be maintained in the industrial world, the pupils who are taking industrial education *must* be given the best possible courses in science, broad in scope and with wide applications. With such a preparation the industrial worker of the coming generation may rise to a position of responsibility; without it he must ever be limited in his industrial growth.

It is, of course, true that men have risen in industrial work from the lowest position to the highest without much, if any, knowledge of science. However, if we remember that the applications of science have been greater during the past twenty or thirty years than during the whole history of the world, we must realize that the young man, just starting in life, must know considerable of science if he is to take his place in modern industry. Competition constantly is becoming keener, and the demand is being made for brains as well as for brawn. The direct value of science to industry can not be over-estimated; it is the warp of industry, upon which, or through which, are woven its woof of industrial practices.

Industry and Vocational Science

Industry itself is somewhat slow to recognize the value of science as part of the education of the workers. The development of industry has been through an evolution of practices, slow and often cautious, retarded and restrained by the greatest of conservatism. There has always been a large amount of the "rule-of-thumb" methods—industrial habits, if you wish; too much of industrial tradition. The "tried and true" methods held their sway during the rise of science, and the latter has been obliged to knock unrecognized at the doors of industry. When finally a belated recognition took place it was with a complete surrender to the methods of science; but the scientific attitude of mind has only slowly seeped down from the engineering and experimental departments of industry to the shops and to the workers in industry. Although schools have lagged behind the demands of the times in many particulars, it is quite certain that in the case of vocational science the schools are well in the lead of the times.

The indirect values of industrial science may be of as great worth as the direct values. Through its aid are produced a body of alert, thinking and efficient workmen; its teachings lead to a better understanding of world conditions, which in turn aids industry. In the study of science most pupils learn for the first time to observe the world in which they live, and to express the results of their observations in well-chosen language. Life to them has consisted of a disconnected series of events, more or less pleasant, to be described by them, if the demand has ever been made, in general terms and partial statements. Due to this incompleteness in living most pupils have difficulty with their science work, especially in the beginning classes, attributing to science their inability to understand the commonplace and to interpret it in proper terms. Perhaps the chief value of science, in addition to the actual subject matter, is to develop this power to observe, to measure, and to draw valid conclusions, expressed in exact terms.

Mere exposure to nature does not teach the laws of nature; combined with the exposure must be the lens of teaching to produce the clear image of learning. The only methods of reaching the mind of the pupil are through his senses—sight, hearing, smell, taste and touch. If these senses have not been trained by teaching so as to convey to the mind the whole truth, then there can be no real understanding on the part of the pupil, of the world in which he lives. There is no course so well adapted for accomplishing this purpose as the industrial science course, due not only to the close relationship which it has with the work of the shop and with the daily life of the pupil; but also to the limitless field of subject matter, covering as it does every branch of human endeavor.

Sense Training and Imagination

The senses may be trained just as the muscles are trained, and by much the same method; namely, by exercise. Note that there is a great difference between training and educating; the senses must be trained, whereby the mind may become educated. On account of the laboratory methods of teaching science the pupil receives constant and controlled exercise in the use of his senses. To a very great extent the science work consists of supervised study of the things themselves; a study of matter and energy under ideal conditions which can not be so well controlled in any other study. For this reason the pupil learns to realize more fully the actual meaning of what his senses convey to his mind, and thus he becomes more open to the knowledge of the world.

Science tends to develop the power of the imagination, giving to the pupil the ability of drawing from memory combined with the power of visualizing both drawings and actual machinery. It gives to him the spirit of investigation, the desire to improve the thing upon which he is working, makes him critical to the end that imperfections may be removed. With scientific training and education in the possession of the worker in industry, combined with the true scientific spirit of truth for truth's sake, aided by the conscious standards which science always establishes in the minds of its possessors, the world would advance much faster in industrial efficiency than it would without the aid of science.

A knowledge of science, or rather the habits which are formed through a study of science, lead to a greater self-expression. A person expresses himself in speech, drawing and writing, choosing the actual tools of expression, according to his training and education. In science the pupil learns to select the right word, with the exact meaning, to be concise and to make complete statements. There is probably no other study which gives equal opportunities; for no other study makes similar demands upon the pupil. Due to this acquired ability the world is the gainer, since the value of an individual to the community can be indicated only by what he does and by the thoughts which he expresses in such a manner as to carry conviction.

There is a subjective value of science which must not be overlooked. If the industrial worker knows what he is doing, from a scientific viewpoint, he will have a greater amount of satisfaction in his work. The commonplace becomes enriched and the ordinary conditions of life take on a larger meaning. There is a growing joy in pride of accomplishment, and the work ceases to be merely a means of livelihood, but an art; the worker becomes an artisan. Unless a man can find joy in his work he can not be satisfied and happy; only he who enjoys and takes pleasure and pride in his work can do his best.

Preparation for Growth

Like all education, although to a higher degree, science prepares for future growth, giving the power to wrest the real meaning from lectures, conversations and the printed page. There is not a single trade journal, which is worthy of the name, that does not require a knowledge of science on the part of its readers. Drawings can not be properly interpreted without a knowledge of science; mathematical tables, formulas and curves are but meaningless symbols without its aid. Finally, science protects against wrong reasoning, erroneous statements, both spoken and printed, and fraud; for a knowledge of it gives the ability of clear thinking and sound judgment.

The teaching of vocational science, if it is to function in the best possible manner, should be through a complete spirit of cooperation between the shop teachers and the science teachers. There is a natural tendency to consider science instruction as the duty of the science teacher alone, although the science really finds its best expression in the shops. The science teacher must, if he expects to teach effectively, become to a certain extent a "jack of all trades," being able to do at least the simpler jobs of all the shops. In no other manner can he actually obtain the right point of view and win the lasting respect of his pupils. It must be admitted that the study of science is difficult and the science teacher should take every opportunity of causing the pupils to realize that it is worth the effort they must make to learn it. On the other hand, all shop teachers should know as much about the science which is a part and parcel of their shop work as the science teacher is expected to know concerning the shop practices for which he is giving scientific instruction. This is the only method by which the science teaching can become fully applied. The scientific principles should be developed in the science classes; the applications made in the shops.

Outline of Instruction in Sheet Metal for Junior High Schools

F. E. Schneider, Instructor of Sheet Metal, D. A. Harman Junior High School, Hazelton, Pa.

THIS outline of instruction was prepared for use in junior high schools. It is a revision of one prepared at the Oswego State Normal School, during the Summer Session of 1922, and which was later edited by Eugene D. Fink of the New York State Education Department.

The material selected is not designed to serve as a course in sheet metal trade training. The work as outlined is of a prevocational nature, and does not touch upon such important aspects of the sheet metal trade as roofing, heating and ventilating, cornice and skylight work.

The suggestive projects, together with the trade technical information and auxiliary information, will, however, give the student an opportunity to become acquainted with the common machines and tools used in sheet metal work and the fundamental processes performed by them, as well as some knowledge of the materials used and their ever-increasing uses. Practical and useful articles made of sheet metal, that involve the manipulation of the common machines and tools, and illustrate common processes, serve to offer the boy something he will enjoy making and something that will serve a useful purpose.

The benefits of such a course will satisfy the vocational guidance aims of the junior high school, as well as furnish the boy with an activity that he will enjoy, and with which can be "tied up" an enormous amount of related science, mathematics, and auxiliary information that will give the students a better understanding and appreciation of what goes to make up modern industrial life.

It is advisable for the instructor to construct models of as large an assortment of practical and useful articles that are within the capabilities of the boy and have them attractively mounted. They serve to keep before the boy good standards of workmanship and suggest to him what can be made to satisfy his individual needs.

I find it is practical to have a series of popular articles to make in the seventh grade, and another series of more advanced articles to be made in the eighth and ninth grades. Good demonstrations by the instructor, showing the pupils how to make each of the required projects will involve the proper use of all the machines and tools and their adjustments and thus the processes may be taught in order. Individual differences may be taken care of by having the more apt pupil make more objects of a similar character.

Instruction sheets should be provided, after the boy has had sufficient training in the use and care of the machines and tools and the processes performed by them, so that he may make articles to satisfy his individual interests. These instruction sheets which are sometimes called job or procedure sheets, should have the necessary drawings, specifications, and instructions to do the job. They should be made up for a wide range of projects. They serve as a device for individual instruction and take care of individual differences. They can only be used successfully, though, after the boys have had instruction and practice in making the regular class projects.

Occasionally a job may be run through on a production basis to illustrate commercial methods. Articles such as dust pans, pails, and waste baskets for the schools are suggestive. If the boys are held up to good standards, they will in most cases pay for the material used, and take the articles home.

Records should be kept of the work completed, together with the grades, so that when the boys come under the teacher's instruction again in the eighth grade, he will know what they have done and will be better prepared to outline their work for another term.

The following list of books will be found helpful in suggesting material suitable for organizing a course in sheet metal. Some have been referred to in this course of study.

Books	Author	Publisher
Sheet Metal Work	Bird and Trew	Manual Arts Press, Peoria, Ill.
Essentials of Sheet Metal Work	Daugherty	F. J. Drake, Chicago, Ill.
Sheet Metal Workers' Manual	Broemel	F. J. Drake, Chicago, Ill.
The Tinsmith's Helper	H. K. Vosburgh	United Publishing Co., New York City.
Trade Foundations	Rodgers and others	Guy M. Jones, Indianapolis, Ind.
Hygiene for the Worker	Tolman	American Book Co., New York City.
Occupations	Gowan & Wheatley	Ginn & Co., New York City.
Apprenticeship and Industrial Education	Paul H. Douglas	Longmans, Green & Co.
Case System of Teaching Hygiene		Case System Co., Princeton, N. J.
The Story of Iron and Steel	Smith	D. Appleton & Co., New York City.
Applied Science for Metal Workers	Dooley	The Ronald Press, New York City.
Sheet Metal Worker	Kittredge	U. P. C. Book Co., New York City.
Elements of Sheet Metal Work	R. L. Welch	Bruce Publishing Co., Milwaukee.
Sheet Metal Primer		Stark Rolling Mill Co., Canton, Ohio.
Armco, in Picture and Fact		American Rolling Mill Co., Middletown, Ohio.
Berger Bros. Mfg. Co.—Catalogs of Supplies and Equipment, Philadelphia.		
Pexto Mfg. Co.—Catalogs of Machines and Tools, Southington, Conn.		
Niagara Machine and Tool Works—Catalogs of Machines and Tools, Buffalo, N. Y.		

In preparing unit instruction sheets, the following monograph will be found very useful: "Unit Instruction Sheets and Individual Instruction in Vocational Schools." By Rodgers and Furney. Publisher, C. F. Williams & Son, Albany, N. Y.

This course of study can be attractively mounted

OUTLINE OF INSTRUCTION IN SHEET METAL FOR JUNIOR HIGH SCHOOL USE

Machines and Tools Processes Performed by Them	Suggestive Jobs	Trade Information: Drawing	Technical Information: Mathematics	Technical Information: Science	Auxiliary: Trade Terms	Auxiliary: Hygiene and Safety	Information: Voc. Guidance	Information: English
1. To Teach the Use of Squaring Shears Cutting out stock to blank sizes. Squaring up stock. Trimming up straight edges.	Cut out stock for class project in quantity, showing how guides on bed may be used to advantage.	Sketch a cross section and longitudinal section of a blast furnace.	If a box of IX bright tin contains 112 sheets 20″x28″ and cost $30, how much will one sheet cost? How many pieces 4″x4″ can be cut from one sheet?	What is iron ore? Describe the blast furnace process. What is "pig iron"? Ingot iron? See "Sheet Metal Primer."	IC. Bright tin. IXL. Bright tin. IX. Bright tin. IXX. Bright tin. Sheet iron Galvanized iron. 14 ounce copper Terne plates.	Care must be exercised to avoid cutting fingers in squaring shears. See guides for machines, page 82 Pexto Machine Catalog No. 20-A.	Work of the sheet metal worker in the building trades. In the tin shop. Describe some of the various branches of the sheet metal industry.	Write a letter to Stark Rolling Mill Co., Canton, Ohio, for a "Sheet Metal Primer."
2. Laying Out Work on Sheet Metal Rule.....Measuring Dividers.....Spacing off Scratch Awl.....Tracing around patterns Circumference Rule Calculating Prick Punch.....Punching marks on metal	Cooky Cutters Round, diamond and hexagonal shaped. Top edge and edges of handles are to be double hemmed. Round biscuit cutter to be 2⅝″ in diameter. Diamond and hexagonal cutters to be 2 7/16″ and 1⅝″ on each side respectively.	Draw plan and elevation of hexagonal cooky cutter. Draw stretchout and allow ¼″ for lap seam. What is projection, and development?	If each side of hexagonal cooky cutter is 1⅝″ and ¼″ is allowed for lap seam, how long would stretch-out be?	manufacturing of Armco Ingot iron as described in catalog published by American Rolling Mill Co., Middletown, Ohio.	Laying out. Spacing off, notching, notching, single hem, double hem, lap seam. Stretchout development.	Good habits for the Worker, Tolman, chapter 3. Be accurate and neat. Place tools on racks when through using them.	Discuss the advantages of the mechanic who is able to lay out work from plans and blue prints. The relation of pattern drafting to shop practice.	Write letters asking for catalogs on machines and tools used to work sheet metal.
3. To Teach the Use of the Bar Folder Adjustments for turning sharp folds for: 1. Lock seaming. 2. Single hemming. 3. Double hemming. Adjustments for turning round folds for: 1. Wired edges. 2. False wire edges.	Turn ⅛″ double hem along top edges of cooky cutters and edges of handles. Turn round edges for wire for tin cup or quart measure.	Draw plan, elevation, and stretchout for the round biscuit cutter.	Relation of circumference of a circle to the diameter. If biscuit cutter is 2⅝″ in diameter, how long must the stretch-out be?	Describe annealing process of treating sheet iron. Why is tin and zinc used to coat sheet iron?	Lock seam 26 gauge, coke coated, charcoal coated.	Be sure the adjustments on the bar folder are set right before using. One boy should use machine at a time.	Discuss the aim of the course in sheet metal in the junior high school to trade preparatory courses as given in the vocational school.	Explain in two minute speeches how you made the hexagonal cooky cutter.
4. To Teach the Soldering Process 1. Forging soldering copper. a. Pointed copper. b. Bottom copper. c. Hatchet copper. 2. Cleaning point of copper. a. While hot, file point bright. 3. Tinning point of copper. a. Heat copper hot enough to make fumes come from sal ammoniac when point is rubbed against it—BUT NOT RED HOT. b. Rub point of copper on block of sal ammoniac with small piece of solder. c. Dip in solution of sal ammoniac or wipe with damp rag.	Solder lap seams and handles on cooky cutters previously made. Note — Instructor demonstrates advantages of having copper properly tinned, and shows proper method of holding copper in relation to work. Rosin is used as a flux in soldering tin plate.	Sketch various types of soldering coppers: 1. Pointed. 2. Bottom. 3. Hatchet. 4. Roofing. Label parts of each cooper and shade portions that should be tinned.	If one sheet of IX bright tin 20″x28″ cost $0.35, how much will a piece 4″x4″ be worth? How much will a piece 4″x10″ be worth?	Discuss the alloy solder as to its composition and properties. What action does the sal-ammoniac have on the copper? What is the advantage of having the copper tinned?	Forging. Tinning copper. Pointed copper. Bottom copper. Roofing copper. Hatchet copper. 3-pound copper.	Hold copper firmly in vise while filing. Hold file correctly. Blow fumes of sal-ammoniac away while tinning copper. Avoid overheating copper. Proper method of testing heat for soldering, hold copper 6″ from cheek.	The importance of neat and careful soldering is a prime requisite of the sheet metal worker, and the care and proper use of the soldering copper is necessary for good results.	1. Applying for a job. a. Study procedure. b. Write letter of application and letter for recommendation. 2. The importance of courtesy. a. How to get into an office. b. What to say. c. How to answer questions.

Machines and Tools Processes Performed by Them	Suggestive Jobs	Trade Information: Drawing	Technical Information: Mathematics	Technical Information: Science	Auxiliary: Trade Terms	Auxiliary: Hygiene and Safety	Information: Voc. Guidance	Information: English
5. To Teach the Use of Forming Rolls Forming up cylindrical bodies. Forming up flaring bodies. Forming up wire. Forming up bodies with wire edges.	Sugar scoop Flour scoop Pail Dry measures Tin cups Flaring pails Oil measures	Develop pattern for sugar scoop, using the parallel line method. Consider economical use of material in design.	If the stretch-out for sugar scoop is 10" long and ¼" is used for lap seam, how large would scoop be in diameter?	What effect has annealing on sheet metal? Why is it necessary to "break the tin" in the forming rolls?	Breaking tin Cylindrical flaring	In using the forming rolls be sure that gripping rolls allow ample clearance for lock seams.	Discuss merits of catalogs and trade magazines as references for tradesmen.	In asking for solder, tin or galvanized iron drill pupils in the proper way to address the teacher and the correct way to ask for anything, "May I have a piece of solder?" as against the one ejaculation "Solder." Discourage such statements as "Gimme a new piece of tin."
6. To Teach the Use of Cornice Brake Forming up sharp folds and bends For lock seaming, For round edges. Forming up moulded surfaces for cornice work, paneled work.	Match box Mail box Seed pan Lunch box Tool box Ash pan Fish tackle box Medicine cabinet Fireless cooker Taboret Square pipe	Draw working drawing for match box and then make stretch-out for pattern.	Calculate number of square inches in pattern for match box. Find the volume.	Prepare chloride or zinc or soldering acid. What gas is given off when zinc is put in muriatic acid or hydrochloric acid?	Raw acid Cut acid Sal ammoniac Flux	In handling raw acid or cut acid, be careful not to get acid on clothes. Avoid breathing fumes of acids while soldering.	Study catalog from Berger Bros. Co. on school shop equipment and uses. Catalog describes and illustrates sheet metal workers' supplies.	
7. Forming Metal by Hand Over Stakes Raising out metal with raising hammers and forming blocks. Smoothing up metal over round head stakes with mallet. Forming funnel bodies and spouts over blow horn stake. Forming cup and finger handles.	Backs of sugar and flour scoops, Sides of canteens and covers to pails, Funnels Fruit jar fillers Bouquet holders Handles to cups Scoops, etc.	Draw a funnel and develop pattern by the radial line method.	Find the cubical contents of a cone.	Discuss the manufacturing of wire, wire plating advantages of plated wire, p. 210 Trade Foundations.	Raising Loop handle Finger handle Coppered wire Galvanized wire	The effect of alcohol and tobacco on the worker. Tolman, chapter 6.	How to succeed in your work. How to spend spare hours and noon hours. Tolman, chapters 7 and 10.	Describe how a soldering copper is tinned, and explain why it should be tinned. What are the advantages of using a well tinned copper?
8. To Teach Operation of Burring and Setting Down Machines Turning burrs with large and small burring machines for: Circular lap seams, Circular folded seams, Circular double seams. Cutting out circles with circle shears. Setting down burrs with setting down machine.	Turn burrs for: Backs of scoops Sides of canteens Bottoms of tin cups Bottoms of pails Bottoms of oil measures	Draw a circular lap seam, a circular folded seam, a double seam.	Study problems of cubical contents and calculate sizes for dry measures.	Discuss elasticity of various kinds of sheet metals: Iron Copper Zinc Aluminum Lead	Burring Setting down Circular lap seam Circular double seam	Treatment of cuts. Disinfectants. How to care for cuts. Iodine and its use in the shop.	Choosing an occupation with reference to physical and mental requirements. Tolman, chapter 12.	Discuss the preparation of soldering acid or zinc chloride. Why do sheet metal workers call it "cut acid"?
9. To Teach the Use of Turning and Wiring Machines Preparing a groove for the wire on curved edges. Small turning machine, Large turning machine. Closing the metal tightly around the wire. Wiring machine.	Wiring edges of: Funnels Fruit jar fillers Flaring pails Coal bucket Garbage can Oil measures	Draw sketch of rolls used on: Burring machine Turning machine Wiring machine Show relation of upper roll to lower roll.	See tables for standard sizes of pails and measures in "Sheet Metal Work," by M. S. Trew and V. S. Bird, and prove cubical contents.	Discuss properties of lead and tin as to melting points, strength, corrosive tendencies. Also what the alloys of lead and tin are used for.	Turning Wiring Edging	Discuss Case No. 1 of the Case system of teaching hygiene.	Discuss the effect on the trade of the introduction of machinery.	Write a list of the machines used in sheet metal work and tell briefly what processes are performed on each.
10. To Teach the Use of the Beading and Crimping Machines Beading Single Ogee Tripple Crimping	Pressing beads in pails to insert bottom. Single beading upper edge of boxes for cover support. turning ogee beads for decorative and stiffening purposes on garbage cans.	Draw development of pattern for one-half of ten quart pail. Conical or radial line method.	How long must material be cut for 6" stove pipe? See sheet metal workers' manual, page 169.	Explain the stiffening effect of beading and swaging on sheet metals. Why are the ends of stove pipe crimped?	Beading Swaging Crimping Single bead Tripple bead Ogee bead	Discuss the effects of fumes of sal-ammoniac and soldering acid on the sheet metal worker. Need for good ventilation.	Discuss the needs of skilled mechanics in the building trades in Europe and its effect on social life and morals.	Describe fully and in detail how you made a tin pail. Name all the machines and tools used and the processes done in the proper order.

by pasting the several sheets on pieces of bristol board and then binding the sheets with a sheet of IX bright tin, having the edges hemmed about three-eighths of an inch. The several sheets may then be assembled by using wire rings and fastened to a panel on the wall. This method serves to preserve the sheets and keeps them readily accessible.

Instruction sheets may be mounted in a similar manner and fastened to the walls in several places around the shop. Additional instruction sheets may then be added to the rack as they are developed.

Grateful acknowledgement is made to the many teachers who contributed their suggestions, which helped to make up the original outline of instruction in sheet metal, after which, this one is patterned.

Book Binding, Repair, and Rebinding

Chat. A. Picken,[1] Elementary Shop Teacher, Detroit, Mich.

The repair and rebinding of textbooks and library books has been undertaken in the Detroit elementary schools during the past four years as a manual arts activity for the fifth grade. During the school year 1920-21 the work was begun experimentally in six schools, or "manual training centers" as they are termed in the local educational parlance. In the school year 1921-22 twenty centers were in operation, and in 1922-23, forty centers were doing the work.

While the activity developed for educational purposes has been enormous, the total number of books discarded as "worn out" has been reduced to an unbelievable minimum.

It would not be amiss at this point to give an approximation of the cost of such savings. The principal cost of book repair is, of course, labor. Where labor must be paid, it is a great deal cheaper to throw away a book costing fifty cents to a dollar, and buy a new one, than it is to rebind it; but with the labor gratis, the per copy cost of the thorough over-hauling and rebinding of books is infinitesimal. In Detroit, during the past year, it approximated one and one-half cents for each copy handled. The cost of equipping a center, aside from the paper cutter, which, while a great convenience, is not absolutely necessary to the work, is approximately sixteen dollars; while the supplies for each center will amount to from fifteen to twenty-five dollars for the first thousand books handled, and will decrease proportionately as more and more books are repaired.

For the benefit of those who desire to give a course of this nature a try-out in their schools, the following is the standard equipment used in Detroit for a center equipped to care for classes of thirty pupils each:

Awls, hafts	6 each
Awls, points, small	6 each
Boards, Auburn, No. 20, 7"x9"	200 each
Bone folders	30 each
Brushes, Marking	12 each
Brushes, Sash, 1"	24 each
Brushes, Bristle, ½" round	6 each
Needles, Darning	30 each
Pans, Pudding, 1-qt.	12 each
Rubber Stamps for Book Repair	1 each
Scissors	30 pairs
Stamping Pads	1 each
Wires, coppered, No. 9, 10" long	200 each

The supplies needed for each class of thirty, per semester, are:

Adhesive Mending Tissue	40 sheets
Alcohol	1 Gallon
Gummed Cloth	40 Sheets
Erasers, Art Gum	48
Erasers, Ink	48
Glue, Arbol	1 Quart
Olive Oil	1 Pint
Paper, Ruled	1 Ream
Paper, Plain	1 Ream
Paper, Waxed, 24"x36"	20 Sheets
Paste, Stecco (dry)	2 Packages
Sandpaper, No. 00	8 Quires
Shellac, White	4 Quarts
Sponges, Small	48
Stripping, Single	2 Rolls
Stripping, Double	2 Rolls
Thread, Barber's No. 40	6 Spools
Thread, Carpet	6 Spools
Twine, Hard Twist	2 Balls
Vellum, Black	1 Roll
Vellum, Green	1 Roll
Vellum, Brown	1 Roll
Vellum, Red	1 Roll
Vellum, Tan	1 Roll

The course of study, as laid out by Miss Blair, to whom I have elsewhere acknowledged my indebtedness for my statistics, and the fundamentals of my education, along the lines of which I write, is as follows:

General Directions

How to Open New or Rebound Books: Hold the book with its back on the desk; let the covers down on the desk, one at a time; then, holding the leaves with one hand, let a few of them down at the front and press down; do the same at the back of the book, and so on. Repeat this turning down a few pages at a time, until the middle of the book is reached. Do this two or three times to get the best results. The back of the book will yield to this treatment if it has not been too tightly or strongly lined.

Caution: Do not open a book violently or carelessly at any one place. By so doing you are apt to break the back and thus cause a "start" in the leaves. Never "force" the back.

Position of Books in a Pupil's Desk: Lay the book on its side, seeing you cannot stand it in an upright position in the desk. Always be careful not to crowd the books in too tightly, for in so doing the book will have to be rebound much more quickly than it otherwise would.

Position of Books on a Teacher's Desk and on the Shelves: Books, especially the large, heavy ones, should be kept upright on the shelves, and never allowed to rest on their front edges. This injures the joint. When a book cannot stand upright on the desk or shelf, it should be laid on its side. When books are taken from the shelf, they should be pulled out by taking hold of the middle of the back; never by the top. This is best done by pushing the books on both sides of the desired one in a little, thus allowing one to get a good hold. Books should not be stacked too tightly on the shelf. It is best that room be left for one more. Too much crowding injures the joint. If only a few books are to be kept on the shelf, the books should be kept in an upright position and held by a book end, or allowed to lie on their sides. Stacking books at an angle strains the joints.

Book Marks: Book marks, such as a ribbon or a little piece of paper, aid in protecting the book, as a careless person is apt to put the book face downward, to insert a pencil, or turn down the corner of a leaf to mark the place.

Turning Pages: It is best to turn pages from the upper right hand corner by placing the thumb against the page as a brace, and the first or second fingers against the top edge near the corner. One can then turn the

[1] I desire to most gratefully acknowledge my indebtedness to Miss Maude Blair, Assistant Supervisor of Manual Arts, in charge of Book Binding and Repair, for her indispensable assistance in the preparation of this article.—C. A. P.

pages easily. It is not good for the book (or for oneself) to moisten the fingers while turning the pages.

How to Stack Books While Drying: Books should be stacked where there is plenty of circulation to aid in the drying.

1. Place coppered wires in the joints.
2. Cover the books with waxed paper.
3. Place book between auburn boards and in an airy place to dry.
4. As the books are stacked, reverse every other one, so as to keep the piles from tipping.

Repair of Books

Judging of Books: When to Repair, when to Bind, and when to Replace.

No school can afford to have shabby books. Soiled books should be cleaned, and ragged books should be mended, because:

1. Taking it from an economic standpoint, the life of a book is shortened by neglecting to bind it when it first shows a need.
2. If books are given the proper care by one pupil, a standard is set which will help to insure a like treatment from other pupils.
3. Pupils have a right to expect that books shall be whole and clean. The books should be in proper condition for satisfactory use.

When to Bind: 1. Books should be sent to the bindery, even though in great demand, when the first signs of need for rebinding are detected. The prompt rebinding of a book doubles or trebles its life. Only in rare cases are books rebound more than once.

Books should be bound:

1. When the stitches break and a section is loose.
2. When a few leaves have fallen out, but are not missing.
3. When the stitches have not broken, but all, or some of the sections, are loose.
4. When the book shows signs of loosening from the cover at the joint, especially where the super shows signs of loosening from the back along the sewing.
5. When the stabbed sewing has given away.

When to Repair: All temporary repair should be given a book at the first signs of its giving way.

Books should be repaired:

1. When pages are torn.
2. When the covers are off, i. e., if the stitches are not broken or loosened.
3. When the joints are loose.
4. When all sections, save the first and last, hold firmly together.
5. When the book has been rebound once, and is in need of further repair.

Mending makes rebinding more difficult, so care should be used in judging.

When to Replace: Books should be replaced:

2. When the cost of a new book is less than the rebinding.
2. When leaves are missing and additional pages cannot be purchased.
3. When leaves are very soiled and cannot be cleaned without making holes in the paper.

A BOOK BINDING CLASS CONDUCTED BY THE AUTHOR.

4. When leaves break away from the stitching because of the poor quality of the paper.

The Repairing of Books: Too much mending is bad for a book. Always think of rebinding before mending, as mending is only a temporary step.

Paper that is to be used for mending should be cut with the grain, and should be of lighter weight than the leaves of the book.

Cloth should be cut the long way of the material.

Books belonging to one group of pupils should never be put into the hands of another group without first being examined for loose leaves, tears, dirt marks, etc. Every pupil is entitled to a book in good condition.

Cleaning Books

Exercise 1 — Book Covers: Book covers may be cleaned with water, Ivory soap and water, powdered pumice stone, or vinegar and water. For the latter, take one part of water, and two parts of vinegar; apply with cheese cloth and rub until dirt is removed. Vinegar should not be used on leather bindings. Covers should be shellaced after being cleaned and repaired.

Exercise 2—Shellacing Covers: In shellacing a book, hold it by the printed pages while applying the shellac. Be sure to shellac all the vellum. After finishing the first coat, hang the book on a cord to dry over night. After the coat has dried, rub the covers with a little olive

oil to prevent sticking. Cloth should only be dampened with olive oil. The best quality of shellac should be used to prevent books from becoming gummy and hard.

Exercise 3—Leaves: (a) All pencil marks should be erased with a soft eraser (Art Gum).

(b) Ink spots should be erased with an ink eraser, if possible, without spoiling the print, or making a hole in the paper.

(c) Soiled pages can be cleaned with Ivory soap and water, with just clear water, applied with a soft cloth or sponge, or with pumice stone rubbed on dry with a piece of clean cheese cloth. Always rub from the inner margin of the page to the outside to prevent crumpling. Brush off all particles of eraser and pumice stone so that nothing will lodge in the folds of the book. In washing with water, the soft cloth or sponge should be dampened slightly.

(d) Mud stains may be removed with a preparation of the following proportions:

1 cup of water,
1 teaspoonful of ammonia,
4 drops of carbolic acid.

Care should be taken not to rub too much with sponge or soft brush as the printing is apt to blur. Plain white paper should be placed on both sides of the leaf to prevent other pages from getting wet, and also to help absorb the moisture. Put under weight to dry.

Exercise 4—Edges of Leaves: Edges of leaves may be cleaned by fine sand paper (No. 00). Hold the leaves firmly between the thumb and first finger, while using the sandpaper. Care should be taken not to sand paper any part of the covers.

Repairing Books

Exercise 5—Torn Pages: All torn pages should be mended.

(a) Pages torn through the printing can best be mended as follows: Place a piece of plain paper under the torn leaf. Cut a piece of transparent mending tissue the shape of the tear, about one-half inch wide, and one inch longer. With a damp sponge moisten that part of the page to be mended. Lay the mending tissue, the glue side down, over the tear. Rub lightly and put a piece of plain paper over the page just mended. Repeat in like manner on the opposite side of page. After all tears are mended, close book and put under weight to dry.

(b) Pages torn in the margin can best be mended as follows: Place a piece of plain paper under the page to be mended. Cut a piece of transparent mending tissue, a little more than twice the length of the tear, and about one-half inch wide. With a damp sponge moisten the part of the page to be mended. Lay the mending tissue, the glue side down, over the tear, so one-half of the strip projects out beyond the page. Rub lightly and place a piece of plain paper over mended portion; turn the leaf over and moisten the opposite side of page to be mended, and fold mending tissue down over the torn part. Rub lightly. After all torn pages are mended, close the book and put it under a weight to dry.

More and more care should be spent in mending the finer and more expensive books. There are three methods, as follows:

1. Rub a very little paste on one of the torn edges, letting the torn edges come together. Then cover the torn part of leaf on both sides with a piece of plain tissue paper. Rub the tissue gently along the tear and put under a weight to dry. This makes the tissue adhere to the torn part, and helps to strengthen the leaf. When the leaf is thoroughly dry, tear the loose tissue away. Always pull with the tear. This makes a very neat piece of mending, as it is almost impossible to see where the tear has been.

2. With a sharp knife, scrape the edges of the tear so the fibre in the leaf laps over the torn part. Lift the top part of the torn page and apply a little paste; then press the torn parts together. Waxed paper should be placed on both sides of the tear to prevent the paste from sticking to the opposite edges.

3. Apply paste to one of the overlapping edges of the tear. Press down carefully. Then cover both sides of tear with a piece of waxed paper, and put under a weight to dry. This makes a very good finish.

Exercise 6—Loose Leaves: (a) "Tipping-in"—Loose leaves should be replaced as soon as discovered. The "tipping-in" method is used. Test the leaf to see that it fits exactly in the book. Then place the loose leaf on a sheet of paper, covering it with another piece of paper, preferably waxed paper, as this can be used over and over again, leaving about one-eighth of an inch of the sewed margin uncovered. Apply paste to the exposed margin. Insert leaf in book, taking care that this leaf does not project beyond the other leaves. Close book and let it dry. If the leaves project, slightly trim after drying.

(b) If the inner margin is very ragged, cut a strip of paper the width of the plain part of the inner margin, and about two inches longer than the length of the leaf. The plain paper must not project over the printing. Place the loose leaf on a sheet of paper and cover the printing with another piece of paper (preferably waxed paper) leaving the whole inner margin exposed to be pasted. Apply paste with a brush. Remove the waxed paper and lay the strip down on pasted part of leaf. Rub down well and let dry. Cut off the extending strips of paper. Fit the leaf to the book to see that the edges do not project beyond the margin of book. Proceed now as in "tipping-in."

(c) Leaves that extend beyond the margin: If it is found that the leaf cannot be "tipped-in" without this margin extending beyond the edge of the book, fold one-eighth of an inch of the inner, or sewed margin, of the leaf over a steel ruler, and press down well. This makes a hinge. Slip a piece of waxed paper between the hinge and leaf; then apply paste to outer edge of hinge and insert in the book. Rub the hinge down well with a bone-folder against the adjoining leaf. Remove any surplus paste. Place a strip of waxed paper between the hinge just made, and the leaf just inserted, and close the book to dry. The waxed paper keeps the leaves from sticking together.

(d) Another method used in inserting loose leaves where the inner margin is worn, or the paper is heavy, is to cut a strip of paper three-fourths of an inch wide, and the length of the leaf to be inserted. Fold this strip lengthwise and apply a thin coat of paste to an outer edge of the hinge, and paste it on the inner margin of leaf so that the margin coincides with the folded edge of the hinge. When this is dry, apply paste to the other half of the hinge, and insert in book. Rub well with a bonefolder. Trim edges if they project beyond the edge of the book. Place waxed paper between the leaves and close the book to dry.

Exercise 7—Corners of Covers: All broken down or worn out corners should be repaired.

(a) Cut two pieces of vellum diagonally about three inches square. Apply paste to wrong side of vellum, and lay pasted side down on one of the corners, so there is about three-fourths of an inch of vellum showing on two sides of corners. "Iron" well. Fold up one of the three-fourths inch extending strips to the edge of the book. Rub down well. Then rub the remaining part of strip down on inside of cover. Fold in the corner as in telephone pad. Repeat on remaining edge in like manner. Put lining on the cover to finish the work.

(b) Repair corners and edges. Broken corners and ragged edges may be repaired by applying a little paste between all of the loose layers of chipboard. "Iron" down well. Care should be taken not to make the corners and edges too thick by using more paste than necessary.

Exercise 8—Backs of Covers: All damaged backs should be repaired and missing backs replaced.

All old super should be removed from the covers.

CHRISTMAS CARDS RECENTLY DESIGNED IN THE ART DEPARTMENT OF THE CENTRAL HIGH SCHOOL, SPRINGFIELD, MASS., UNDER THE INSTRUCTION OF MISS GRACE L. BELL. (C. EDWARD NEWELL, SUPERVISOR OF ART AND HANDIWORK.)

(a) When the old back is entirely gone, and the book is loose from the cover, cut a piece of vellum the long way of the material, about three inches wide (two inches wider and one-half inch longer than the back of the book). Cut a piece of "cotton middles" or heavy wrapping paper the exact length of the cover, and slightly narrower than the back of the book. Apply paste to one side of the strip, and place in the center of the cloth. Rub down well. Apply paste to remaining part of the vellum and place over the back of the book. Be sure the cardboard strip is in exact line with the back edges of the book. Cover with newspaper and press down carefully on the covers. Remove the covers from the book if they are not already off; then turn the vellum in at the top and bottom on the opposite side of book. Rub down well. Put under a weight to dry. Care should be taken that the covers are stretched flat, so the back does not lose any of its width. If the corners and edges need to be repaired, do not shellac until this work is completed, and the book is perfectly dry.

(b) Old backs on books may be pasted on after the repair is finished.

(c) New backs for covers that are fastened on the book may be put on by pasting on a strip of vellum the exact length of the book.

Exercise 9—Replacing Covers—Double Stripping: In replacing covers with double stripping, the super and loose lining paper should be removed first, and the two pieces of double stripping should be cut about one-fourth inch less than the length of the book.

Place the book in the covers, so the edges of the book coincide with the edges of the lining paper on the covers. Turn the top cover back and apply paste along the back, joint and inner margin.

Lay one piece of the double stripping down on the joint, so the stitching fits well back into the joint. Iron down well. Lift the loose part of the stripping to see that the lower piece of cloth is pasted down well. Now apply paste along the cover where the double stripping will come when the book is closed. Close the book, crowding the cover well into the joint. Rub down the joint before opening the cover to see that the super is well placed.

Insert the waxed paper. Repeat in like manner on opposite cover, before setting the joints with coppered wires, and putting the book under weight to dry.

Exercise 10—Reinforcing and Repairing Covers: The covers are broken at the joint and the first and last sections need strengthening. Covers should be removed from books when first and last sections are loose.

Paste a half-inch strip of cloth along the inner margin. Allow this to dry before punching holes for overcasting. The holes should be punched one-eighth inch from the inner or sewed edge through the loose sections, two or three of the sections that are still holding firm, by the old stitching, and out through the back. Begin sewing at the third hole from one end, overcasting to the nearest edge and back to the opposite edge; then back to the third hole from the other, before cutting the thread. The thread should be cut about one inch from the hole. No knots are needed because of the extra sewing. Replace the covers as in Exercise 9.

(To be concluded)

MR. PAUL CRESSMAN APPOINTED TO PENNSYLVANIA STATE DEPARTMENT

P. L. Cressman, who has been director of vocational education at Erie for the past two and one-half years, has been appointed assistant director of the vocational education in the State Department of Instruction at Harrisburg. In his new position he will direct continuation education and will devote some of his time to industrial education.

PAUL L. CRESSMAN,
Assistant Director Vocational Education,
Harrisburg, Pa.

As director of vocational education in Erie, Mr. Cressman was responsible for trade, industrial arts, home making, continuation and evening schools. For a year and a half prior to his appointment as Director he was cabinet trade instructor in the Academy high school, Erie.

Mr. Cressman has had varied experience in public school work, having taught in the manual arts department of the Uniontown high school for two years. Prior to that he was in charge of the manual arts department of the Bloomsburg state normal school for a period of three years. The first three years of his experience he taught in the grade schools of Lehighton, Pa.

Mr. Cressman is a graduate of the Keystone state normal school, class of 1912. He has taken advanced work at the Pennsylvania State College, the University of Pittsburgh and Teachers College, Columbia University. His experience and training will prove a strong asset in the work that he is undertaking for the Commonwealth of Pennsylvania.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

TEACHING THE TEMPERAMENTAL

The teaching process is quite as dependent on the attitude of the pupil as upon the ability of the teacher.

No mind is quite so difficult of development as the self satisfied.

The attitude of the American pupil, suggested by a foreign critic in the statement "Here I am, now teach me," might apply to a certain type of student with the added challenge, "If you can."

These "Teach me if you can" pupils need more than a pat on the back.

Every teacher meets with occasional pupils of indifference to the subject taught and is able to arouse interest through a variety of application; but every teacher also meets with occasional pupils who are vain with success in some one narrow line. The provincial prodigy is the teacher's most difficult problem, and if allowed to persist with his vain, superficial accomplishment, may become the school tragedy.

"I understand that you are a 'whiz' in writing," said the school executive to the gifted but delinquent pupil; "I suggest that you now begin to learn something to write about."

It is reasonably certain that a "style" of expression acquired by a youth in school is either borrowed or subject to change for the better. Teachers sometimes mistake peculiarities on the part of a pupil as evidence of talent. Convinced of talent, the pupil may take advantage of a prevalent superstition, to the effect that ability in one line precludes reasonable ability in other lines. It has never and may never be established that a youth who can draw funny pictures by copying cartoons is by nature unable to understand geometry or mathematics. It is well established by the records of notable people that little desirable success is secured without application.

Probably the best discipline for the egotism which develops in the school prodigy is to subject him to higher standards than those of the class to which he belongs. Our school organization often makes this possible. Contests between schools and communities have developed athletic prowess to a near professional standard. In fact skill in athletics has been developed to the point of discouraging most students from taking part in sports. The most necessary adjustment of athletics is in the way of interesting the great majority to participate. Why not use this method of competition between the selected prodigies of schools and communities to reduce the egotism of the self-satisfied in each course of study? Exchange exhibitions between the schools of a community and the schools of different communities have a decided disciplinary value for teachers and pupils alike.

We are becoming too busy with routine instruction in the subjects other than athletics, to entertain and occupy the interests of the tempermental prodigy. Competition may save him to useful service and develop his budding genius. Competition is the life of more than trade.

STANDARDS OF EMPLOYMENT IN SCHOOL SHOPS

The recent editorial "Counting the Hours and Making the Hours Count" brings a hearty note of approval from a western subscriber and a comment on slackness which is tolerated in many school shops. The writer sends the following valuable circular letter which he addressed in November to the shop teachers of Sacramento:

"Shall we expect from the students under our supervision the same standards of respect, workmanship, industry, and initiative that a successful employer would expect from an employee?

"I see no compromise in the answer. We may not be able to arrive at the objective in the accomplishments in so far as some of our students are concerned. There is every reason to insist, however, that the student in the Vocational Department should react toward his instructor and job just as earnestly as he should toward his employer and job. Should a student conduct himself unbecoming of a worthy employee, the instructor (acting in the capacity of an employer) should not hesitate to remind him that he is peremptorily "fired." I do not mean that you are to put him out of his class but that he should be reminded in no uncertain terms that a similar act on a commercial job would lead to dismissal. You know and I know that the habits of industry formed in our presence will "carry over" into commercial life. When we permit them to lag around in getting to work, to "knock off" too early, turn in incorrect and incomplete reports of the day's work, play on the job, and in any manner show disrespect to authority we are permitting them to develop habits which the employer will openly criticize in the school-trained workman. The school-trained workman's habits are more carefully scrutinized by the employer than is usually the case with those not school-trained. There are several reasons. The school-trained workman should have had better opportunities to learn, he should have been taught to apply, and the cost to the public is the public's business to criticize.

"There is no one in the teaching game better qualified to point out to the student the demands of industry than the practical mechanic instructor. Such an instructor should never hesitate to check right up on the student while the time is ripe. This does not mean that said instructor should stop all activities to preach a sermon. A concise remark of a few words will turn the trick.

"Keep constantly before their minds the exactions of cold, hard job hunting, the serious business of job

keeping, and the joy of promotion that accompanies industrious habits.

"The time is coming in Sacramento when those people who are placing employees will look to the school for recommendations. Those will be bright days for us when we can get returns from the employers that the students we recommend are making good.—*Frank C. Vincent, Head Vocational Department.*"

IS THE SCHOOL TEACHER "PECULIAR"?

Is it true that as teachers of both sexes walking along the streets of any city, they can be singled out and recognized as *teachers* by strangers? If so, why and how? If so, is it a compliment, or not, to the person so recognized and to the teaching profession?

It certainly is no dishonor to be known as a teacher. The only question is as to whether it is complimentary to say that on account of dress, carriage, air of distinction, mannerism, or something else, teachers can be recognized by strangers. It may not be uncomplimentary but we are doubtful of the compliment.

Whatever truth there may be in such a charge, it is probably due to two essential facts concerning a teacher's life and associations. One is the fact that the teacher's chief concern and dealings are with young and immature people. The other is that teachers are rather prone to associate only with members of their own profession, and to discuss mainly topics bearing directly on their daily tasks. Teachers, of all people in the world, are most given to "talking shop." Whenever two teachers meet, there takes place a discussion of the daily tasks of the teacher's job. A very noticeable tendency also is that teachers divide themselves into groups of specialists in the same field of work. This is all very well, if they but keep their contact with the whole field of teaching and education. To be sure, this is a tribute to their genuine interest and to their seriousness of purpose.

No criticism of this zeal and enthusiasm is intended. The plea is simply for teachers to broaden their horizon, to widen their contacts, and to seek association with people in other callings than their own.

There is no greater educational factor in one's own life than frequent contact with people of varied occupations. Membership in the local chamber of commerce, the rotary club, the kiwanis club, the lyons' club, and kindred organizations, in addition to clubs that are specially educational, furnishes an ideal opportunity for making such contacts. The teacher's grasp on his own work will be made all the more firm and potent through his getting the points-of-view of the lawyer, the doctor, the merchant, and the clergyman. And when he gets such points-of-view, broadening his own outlook on life and on his own field of work, he may suddenly discover that his peculiarity has disappeared. The stranger then can no longer pick him out of the crowd as a school teacher!

AN INTERESTING RESOLUTION

The general broadening of the aims and contents of a shop course in elementary and secondary schools has made the old term "manual training" less and less useful. In this connection it is interesting to note that the industrial education men of the state of Texas, at a convention held in November, adopted the following resolution:

"Whereas, the numerous names in common use, which are intended to indicate the types of shop and drawing activities in the public schools of Texas, have created confusion and misunderstanding, both within the various teaching groups and on the part of the public at large.

"The name *Manual Training* served adequately in its day, but it is no longer suited to the content or aim of the courses which it is intended to describe. Therefore, be it

"*Resolved,* That the Industrial Arts Section of the Texas State Teachers' Association recommend that all public schools, or other agencies having to do with these subjects, adopt the name *Industrial Arts* and so use the name in their catalogs, course of study, publicity work, conversation, etc.

"The term, however, is not intended to describe teacher training work or training for immediate earning capacity."

OBJECTIVES OF THE MANUAL ARTS

The household mechanics courses of the manual arts, which have attracted wide attention, are a product of experiments carried on during the past eight years at Detroit, Michigan. Teachers and supervisors of manual arts will be interested in reading Dr. J. F. Bobbitt's "objectives of the manual arts." Teachers working on a new type of general shop courses adapted to three-year academic high schools, will also find encouragement in Dr. Bobbitt's statements. The last three paragraphs were added by the committee as a supplement to Dr. Bobbitt's statements.

The Objectives

1. Ability to perform unspecialized activities about the house, basement, garage, yard, garden, motor, car, etc.

2. Ability as consumer to judge the qualities and values of the products of specialized occupations.

3. Ability, disposition, and habit of "observation" and "reading" of things in the world of productive industry as enjoyable and fruitful leisure occupations.

4. A proportional intellectual apprehension of the world of productive industry; of the specialized occupational groups which compose it; and of tools, machines, raw materials, processes, products, etc., involved. Ability to think in terms of the realities.

5. Ability to choose one's vocation.

6. A disposition and habit of being up and doing, independent, active, and positive in one's home life and one's affairs in general; not dependent upon others, passive, and negative.

7. A disposition and habit of holding one's practical labors to reasonably high standards of performance; of always doing one's best. Dislike of things careless, faulty, incomplete, etc.

8. Ability to appreciate the training and skill required of the craftsman or mechanic and the value of his contributions of service to society.

9. Ability to appreciate the value of organization, management, and quantity production in the industries. (Under management should be included personnel and employment, as well as production.)

10. Ability to offer better judgment and sympathetic understanding of the problems of both labor and capital, and a realization of the necessity for greater cooperation between these two indispensable public agencies.

An Interesting Group of Furniture

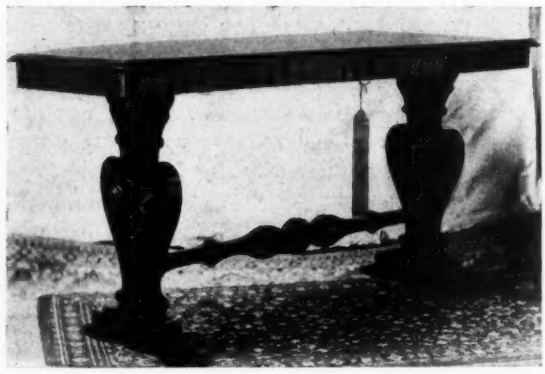
Don A. Sloan, formerly instructor at Winfield, Kans.

Accompanying this article is a group of photographs and detail drawings of furniture, designed and made by students in the Winfield junior and senior high school for exhibition at the Annual Wheat Show at Wichita, Kans. The pieces were made during the school year 1923-1924 and were exhibited in January, 1924. The pieces show what friendly competition will do among boys and how skill and ability as craftsmen will be demonstrated when boys do not merely come to class without an immediate aim. The course in the Winfield high school is prevocational and does not seek to make cabinet-makers out of the boys. The aims of the course are those of the general junior high school shopwork courses and are largely cultural, exploratory, and informational.

During the first three months of each year, drawing and furniture design are studied and boys are given an appreciation of period styles and good taste in home furnishing. Good design and construction are emphasized in the drawing and each boy works out an article which he will make during the last six months of the school year. The shop drawing is rendered to scale and a tracing and blue print are made. From the blue print each boy must make a full-size drawing to see whether he actually visualizes the object and to gain a proper sense of proportion, design, and construction.

The great weakness in many school shops today is that the men who are teaching are five or ten years behind the commercial world and are still developing mission tables with plank tops and with legs that are strong enough to hold up a corner of the Woolworth Building. It has been a constant aim in the Winfield high school to combine beauty with utility and strength and to insist that boys think of these three elements at the same time.

A strong factor in improving work in the furniture shop is to introduce boys to the value of high-grade cabinet woods and to insist that they make articles which have a high commercial value. If a boy undertakes to make a table that will be worth $20 and understands that the material in the top is worth at least $5, his attitude will not be one of indifference but rather of appreciation and interest.

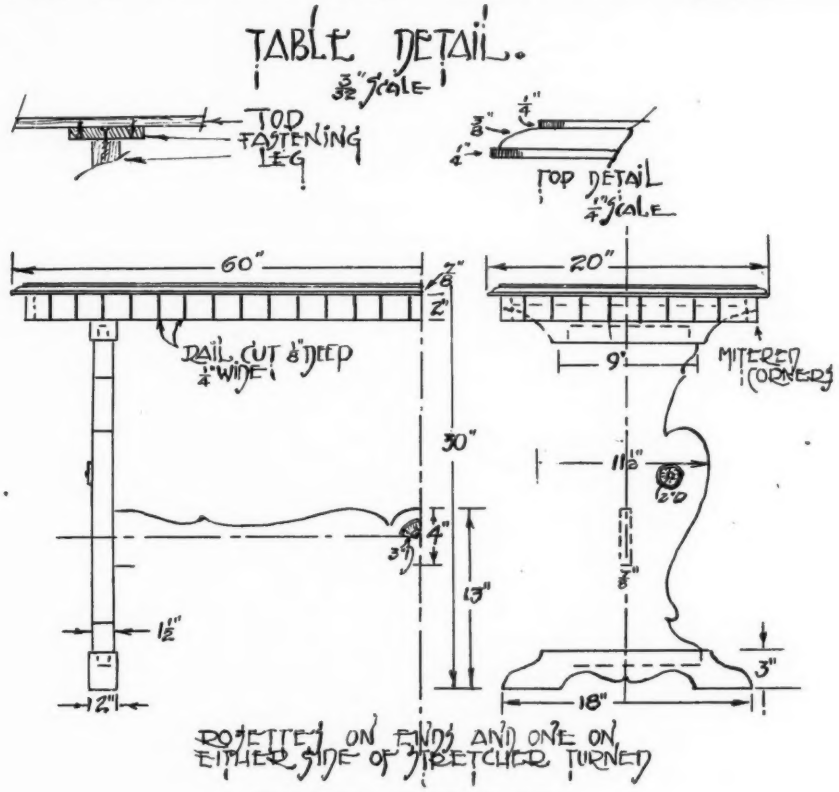


PRIZE WINNING TABLE MADE BY A STUDENT IN THE WINFIELD, KANS., HIGH SCHOOL.

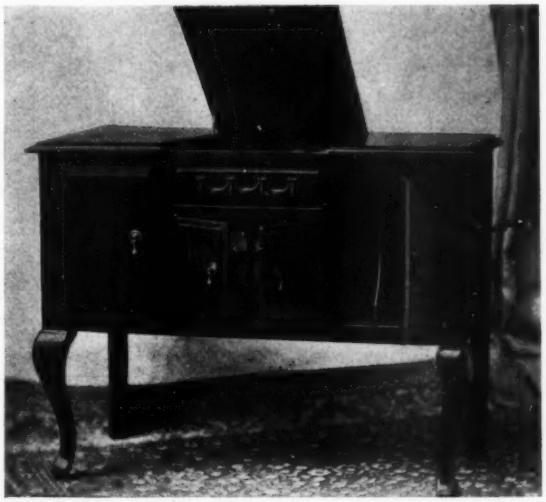
The phonograph shown in the accompanying group of problems cost the boy who made it $65; the table cost about $20. The two boys were able to manage the expenditures by depositing a small amount each month with the instructor, who covered the first cost out of his own pocket.

The Problems

The table is of the Davenport style and is made of mahogany or walnut. In the present instance, mahogany



DETAILS OF A DAVENPORT TABLE.



THE COMPLETED PHONOGRAPH.

was used. The railing is cut on a dado and sanded out. The top is cut with a circle saw and is finished with a bull-nose plane. The other edges are cut with a Stanley plane No. 45.

The phonograph is an interesting problem, particularly since the arrangement can be changed to include a radio outfit and the article will thus serve both as a phonograph and as a radio receiver.

The legs are band-sawn; the ends are paneled stock which needs reinforcement. Solid construction is also acceptable. The top is made by first gluing up the entire top, then cutting off a three and one-half inch strip at the rear for the continuous hinge, cutting twice across for the lid, and finally gluing the two end pieces again to the 3½-inch strip (A).

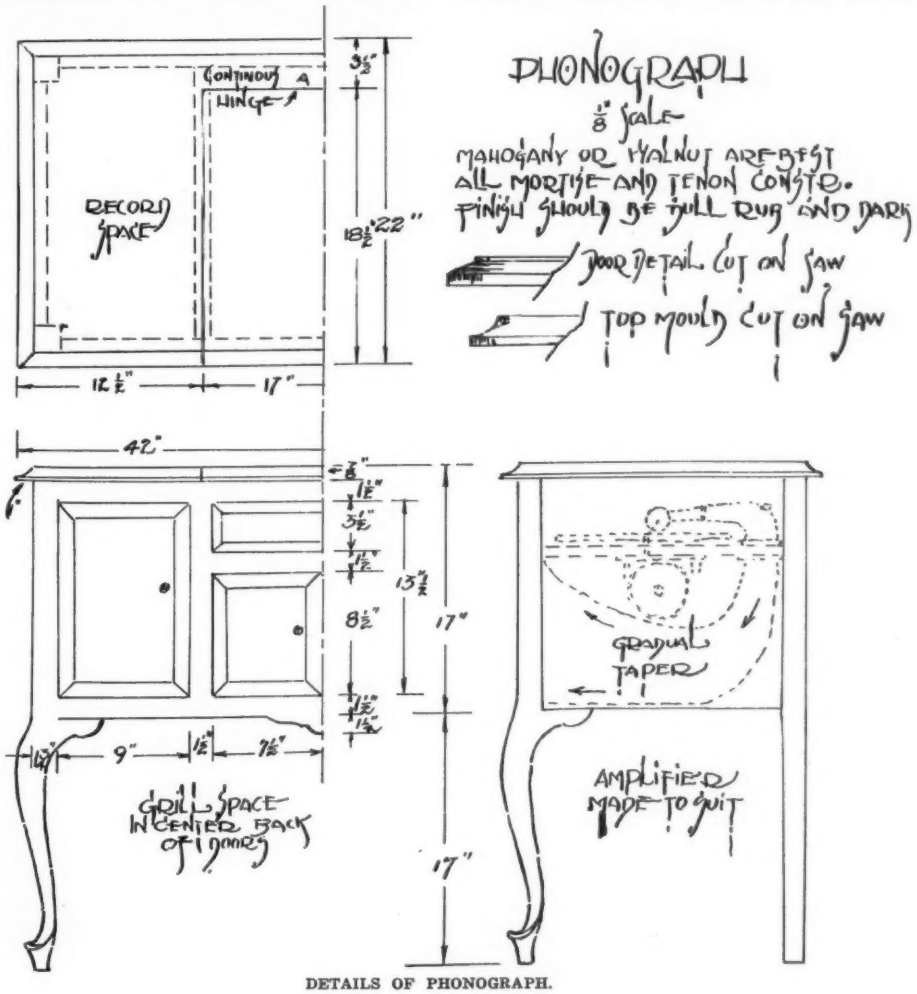
Fir panels are used for the back and bottom.

The doors may be decorated with a surface decoration, or given a two-tone finish. The edges are cut at seven degrees on the circle saw, and the top is cut by running it diagonally to the saw.

The legs are built up on 1¾-inch squares for the front. The rails on the front are flush with the legs to give the instrument a better appearance. The amplifier is made of ply wood and is designed to flare from a given diameter to meet the inside dimensions of the frame. An amplifier may be purchased from one of the phonograph supply concerns. The main point in amplifier construction and installation is to see that no parts are loose to vibrate.

We have found that we can conveniently install a radio receiving set in the case in the right or left compartment and use the same amplifier which we installed for the phonograph. We have used an amplifier made of sheet lead and cork sheeting which has two graduated openings, one leading to the reproducer of the phonograph and one to the reproducer of the radio.

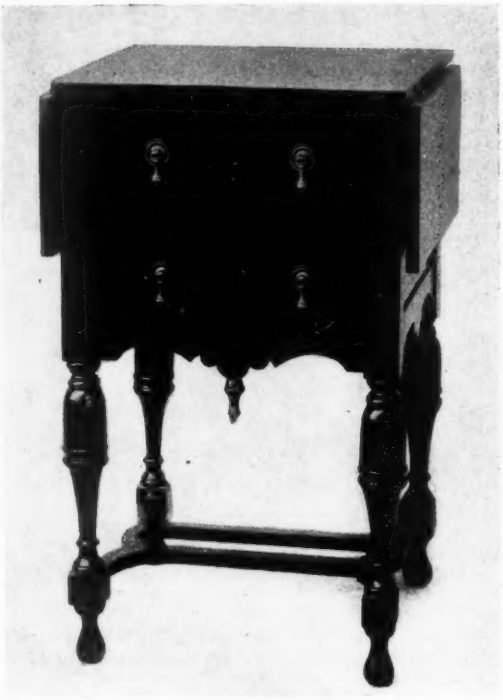
The floor lamp is made of mahogany and the design is not too difficult for a steady boy who has plenty of



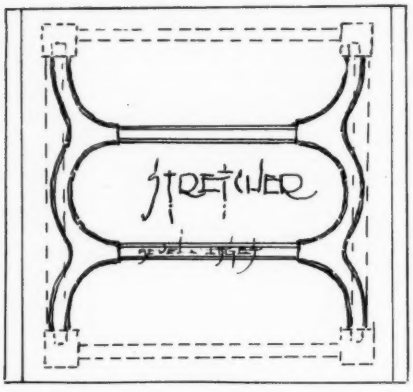
DETAILS OF PHONOGRAPH.

tenacity and a good eye for lines. While the wood-working course in the Winfield high school does not include a separate course in turning, ample opportunity for doing turning in connection with cabinet work is given. It has been found that the arrangement increases the interest in furniture-making and at the same time gives boys ample skill to undertake ordinary wood-turning jobs. It is needless to add that the type of furniture designed is accordingly improved by the addition of turning.

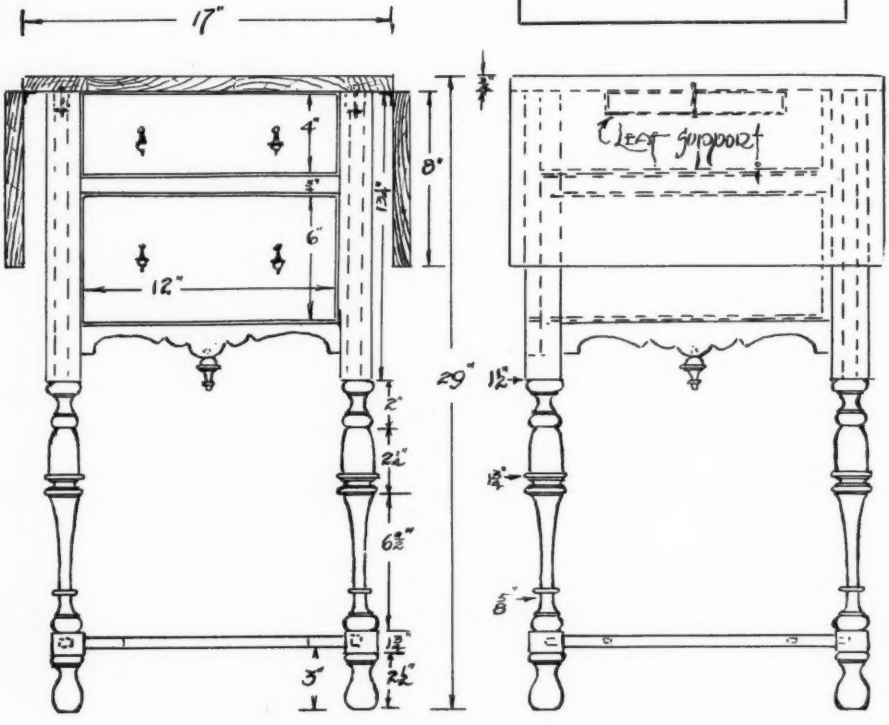
The method of layout for the spiral turning of the lamp is as follows: The spiral is double and the effect is similar to that gained by twisting two pieces of rubber tubing together with a fillet in the groove made by the two pieces. Allowance must be made for this fillet and this is done with a rattail file and sandpaper. The spiral is from a definite point to another point—say from one bead to another, or from the core to a bead. After the length is determined, the space is divided into an equal number of parts. Next, the cylinder is divided into fourths and a line is drawn from one end of the stalk to the other. Next, a tack is set on one line, at the beginning point; the cylinder is turned one-half revolution and a tack is placed on the second point. This gives the cut-

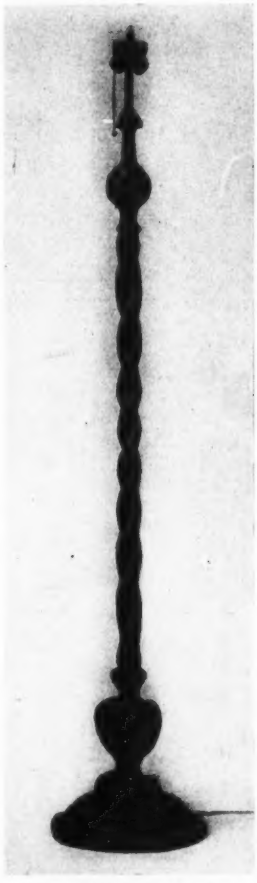


SEWING TABLE.

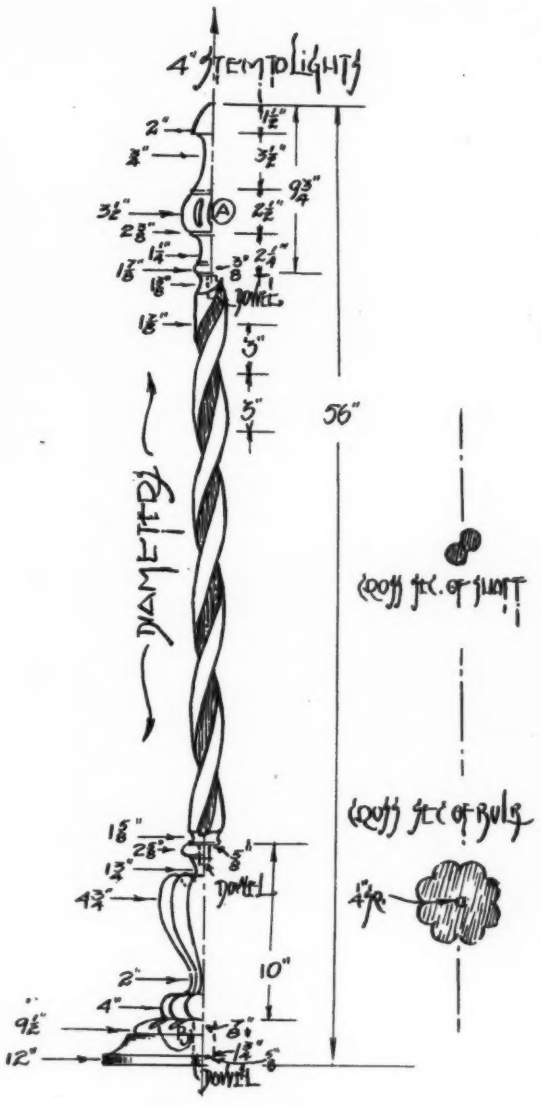


DETAILS OF THE SEWING TABLE.





THE COMPLETED LAMP.



DETAILS OF TURNED LAMP.

ting line of one groove. The operation is repeated with the tacks and with a chalk line until the spiral is developed. The process is repeated for the second groove, starting one-half revolution or opposite the first groove marking. The groove is sawed with a back saw and is shaped with a one-inch chisel. If it is desired to find the center of the tubes or ropes as they twine, the process may be repeated on the half-way points gained from the first process; this will accordingly assist in the cutting.

The base or bulb is laid off in eight parts after it is turned to proper shape, and is carved by hand. The fluting is also done by handwork.

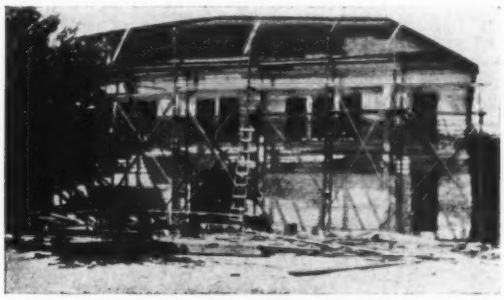
The sewing table is of the William-and-Mary period and involves duplicate turning. We believe that the average boy can learn to turn a gavel or nut bowl and make a fairly successful job of it. It is far more to the point, however, if he is required to turn duplicate parts where slips will be noticeable and where inaccuracies and deflections from the pattern will be decidedly harmful. In the sewing table, as shown, the turning must be accurate not only in that the parts are duplicates but also in that the pattern must be accurately copied.

VOCATIONAL STUDENTS ERECT GYMNASIUM

When the students in the vocational classes of the high school are regularly working each day at carpentry, iron work, etc., why not put them on the job of doing something worth while for the school? Why let them merely work out little problems in cabinet making, etc., which are of no particular help to anyone beyond their value of teaching tool processes?

The Hemet Union High School, of Hemet, California, recently was in need of a gymnasium and auditorium, but the school board did not have the $40,000 that would be needed to put up such a structure. So it was decided that the thing to do was to give to the vocational students the problem of putting up the gymnasium as their wood-working study for the year.

Of course, though, it was necessary for the school to provide the students with the lumber, glass, etc., to work with. Here again the scarcity of money was a big problem. But after considering the matter carefully for a considerable length of time the school trustees made an offer for one of the large frame buildings at March Field, near Hemet, where the government trained so many aviators during the war. The price asked by the government for the building as it stood was $200, but the school said it could afford to pay only $100 and the building was finally secured at this price.



GYMNASIUM AT HEMET, CALIF.

The structure was then torn down by the students and the material moved to Hemet where the work was gotten under way under the direction of the woodworking supervisor, E. A. Parmalee. The work was first started at the beginning of the 1923 school term and by the time school came to a close in June, 1924, the job was almost completed. About 35 students worked on the structure and these averaged five to ten hours' work a week on the building.

The building is 200 feet long by 150 wide, thus containing 13,000 feet of floor space. A hardwood floor has been laid and this will be used as a gymnasium floor or as an auditorium. At the south end of the structure a splendid stage has been constructed with dressing rooms in the basement so that the building is equipped for handling school operettas, etc. On the east side of the building there is a covered addition to the main structure in which a bowling alley has been installed for the use of the students and the faculty.

Hardwood facing on the walls of the building helps to give the place a finished and pleasing appearance and when fully completed the ceiling and beams will be painted white. Of course, complete lighting and plumbing systems have been installed, and the greater part of all the work of putting in the plumbing and lighting systems have also been done by the students.

During some of the times when the more difficult phases of the work were being done it was found necessary to employ professional plumbers and carpenters, but this was the case on only a very few occasions. The students did practically everything about the building from digging the basement, putting the beams in place and laying the floor, to painting the job when it was finished.

It was found necessary to buy considerable lumber for the floors and walls and, of course, the materials used in the building ran up to a rather considerable sum. So, all told, the total cost of the building amounts to about $10,000 or less than a dollar a square foot, which is a very small cost when it is considered that even the most modest cottage costs $2.25 or $2.50 a square foot. And this structure has been built right without a single feature being skimped in any way.

PROBLEMS & PROJECTS

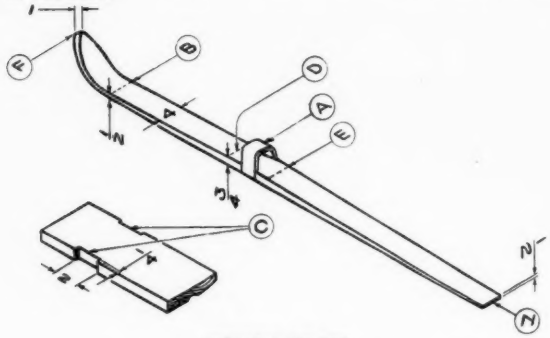
This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

SKIS

Charles W. Frost

Skis are made from four to nine feet long, depending upon the weight of the wearer. A boy weighing one hundred pounds could get along with skis five feet in length, one of a hundred and twenty pounds on six or seven foot, while a man weighing a hundred and fifty pounds or over should have skis of eight or nine feet length. The width of the skis is governed by that of the sole of the shoe. The space between the insides of the toe strap "A" should be approximately the same as the widest part of the sole of the shoe.



DETAILS OF SKI.

The best skis are made of straight-grained ash or spruce, but pine, cypress, or almost any other wood which is not excessively heavy may be used if these are not available. Slash sawn or quarter sawed lumber should not be used, as it is more likely to splinter when bent than the vertical sawed.

Plane two pieces the required width and length. Draw a line "D" across the face of each piece six inches from the center line "E." Across the end "N" draw a line five-eighths of an inch from the face side. Along the edges draw lines connecting the ends of line "N" with the ends of line "E." Plane face side down to these lines leaving face level and square with edges. Twelve inches from the opposite end, draw line "B" across the face of the ski. From ends of line "B" square lines across the edges. From points upon these lines, half way between the edges, draw lines to the end of line "D" and to the face of the ski at the end "F." Plane face of ski to these lines. Scrape and sandpaper surface as smooth as possible. It is advisable to "raise the grain" by soaking in water, sanding down the roughened surface until smooth again, and repeating the process until moisture has no effect upon the wood.

Most skis have sharp-edged, semi-circular grooves in their lower surfaces, midway between and parallel to the long edges. These serve the same purpose as hollow grinding the blades of ice skates.

Expert jumpers fasten the skis to their feet by an elaborate "harness" of straps and buckles, but as a general thing, amateurs use simply a strap about two inches wide set into the edges of the ski and just long enough to permit the foot to be easily slipped in and out. This strap may be of leather, but a thin piece of rubber belting is preferable as it is not affected by moisture.

Skis are usually finished upon the top and edges with Valspar or bright colored paint. The lower surfaces are filled with tallow, rubbed in hot.

SKIS AND SKI BENDING

Frank W. Dejmek, Marinette, Wis.

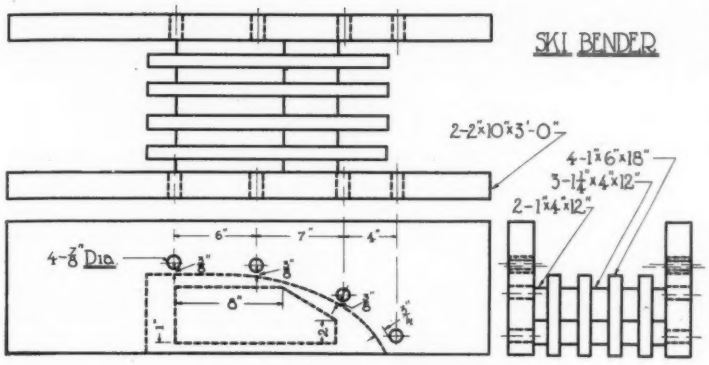
Winter out-of-door sports are becoming more popular each year. Among these sports, "skiing" has become very popular with the young folks within the last few years. It is only natural that the young folks take to skiing when snowstorms continually cover the skating rink. The snow is never too deep for those who ski, especially those who are just learning.

Skis cost from $1.50 to $4 per pair, depending on the length and the kind of lumber used. The cost of the lumber required to make a pair of skis varies from fifty to ninety cents depending again of course upon the size and the kind of lumber used. Straps may be bought for fifteen to thirty cents. Boys taking manual training readily see an opportunity to save money by making their own skis or make money by selling the skis they make.

SKI BENDER AND STEAMER.

White ash and birch are good woods to use for skis. Lumber for skis must be carefully selected. Use only good straight grain pieces that can easily be bent and have a smooth hard-wearing surface. The width of the skis varies from three and one-half to four inches. Joint both edges, making them parallel. Then cut the groove in the bottom with the circle saw or a Stanley 45 plane. The groove should be about one-eighth of an inch deep, three-eighths inch wide, and should begin about sixteen inches from the front. After the groove is cut the point may be shaped. The curve begins about eight inches from the front. By using a templet the boys save time in drawing the points. The back part of the point is the widest part of the ski. From there the ski tapers slightly to the middle and then continues straight back. The back end of the ski should be about one-half of an inch narrower than the front. Then plane the top side of the front and back ends so that the ski is about one-fourth of an inch thick where the bend is to occur, and slope to the back to about the same thickness, leaving a space about sixteen inches the original thickness just a little past the middle to give the ski sufficient strength to carry the weight of the user. The point of the ski should be about five-eighths of an inch thick and slope to the part to be bent. The slot for the strap should be cut so that the front end of the ski over-balances the back part.

The photograph shows the method used for steaming the skis. An old laundry stove was connected with the city water line, placing a valve near the stove to furnish a means of regulating the inflow of water. One end of an old discarded garden hose was attached to the outlet of the stove and the other end to an empty sweeping compound can. In one end of the can a hole one inch by four and one-half inches was cut, through which the front ends of



DETAILS OF SKI BENDER.

the skis were placed. A few holes punched in the bottom side of the can allowed the water formed to escape. The back ends of the skis were spread in order to expose both sides of each ski to the steam.

Waste from the shop was used for fuel. By keeping a steady fire for about one and one-half hours to two hours the skis were ready to bend. Soaking the skis about ten hours before steaming helps to soften the wood fibers a good deal.

The ski benders used were made from two pieces of two by twelves, about three feet long, four curved one-inch pieces about six inches wide and eighteen inches long, and five small pieces used as fillers. Four holes ⅞" in diameter about ⅜" above the curved pieces were bored in each side for the gas pipes used to hold the ski to the curve. The arrangement of the pipes can be seen in the photograph.

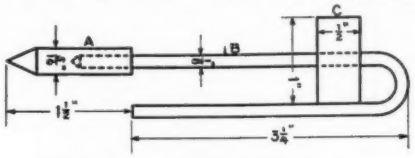
The skis remained in the benders for several days. Then they were removed, the tops and sides varnished, and the bottoms oiled or waxed.

A SEMI-AUTOMATIC CENTER PUNCH

Harry Moore, Rosemount, Montreal, Can.

Here is an old idea for a center punch. Many years ago I was a student at a continuation, or night school, in Leeds, England, and our instructor had a pleasant way of encouraging ingenuity. Picking up some simple tool he would point out how, and where, it could be used to advantage and at the end of the short talk he would ask each one to go ahead and try to improve on the original.

The sketch herewith shows my idea of improving on



DETAILS OF A CENTER PUNCH.

the center punch when used for fine work; and although twenty years have passed I have not met another like it in all my travels, nor one, in my opinion, as good. To produce this tool there is required some good lathe practice and in addition a little practice in hardening, tempering, and bending wire rod. A is the punch proper, B the wire rod shank, and C the weight. A and C are produced in the lathe, B being driven tight into A while the weight C is upon it, and bent around a 7/16 inch rod until both ends are parallel. Slight pressure against C with the finger, holds the weight in any position, and the higher it is allowed to fall the deeper the punch mark will be.

STENCILED DESIGNS APPLIED IN THE SHOP—III

William B. Wright, Public Schools, Albany, N. Y.

In attempting the decoration of larger objects such as a drop-leaf table and chairs for a breakfast or dining room set, a different method of approach must be used. *Simplicity of treatment* and *good taste* are of the utmost importance. If these two essential factors are not understood, it is best not to venture beyond the conventional stripe which is found on many examples of painted furniture. If anything further in the way of decoration is attempted, it must be handled on a most delicate key and must be studied in connection with the whole scheme of interior decoration of the room or apartment. In

FIG. 1.

fact, any painted furniture needs a light treatment of walls and woodwork. Such being the case, the following slight ornamentation of a dining room set, which I am about to describe adds a subtle charm to a room of this description.

Our project was the refinishing of, and application of a stenciled design to, an inexpensive kitchen table and four chairs. The pieces were finished in enamel paint of an ivory tint and the stencil was put on with a light greyish-blue color, thus converting them into a charming breakfast room set. This can be easily handled as a group project in any school shop, in home training classes, or in classes in interior decoration in the following manner:

(1) *Study of the room:* Example of a dining room in which the table and chairs would harmonize:

Walls covered with cream-colored paper.
Floor covering—blue rag rugs.
Draperies—yellow dotted swiss.
Furniture—ivory enamel trimmed with blue.

Show this by means of colored paper as follows:

Walls	Cream
Rugs	Deep blue
Trimming for furniture	Light grey-blue
Draperies	Pale yellow

(II) *Selection of table and chairs* to be finished and decorated—(In many shops these chairs and tables could be made).

(1) Visit furniture stores and examine different types of tables—drop leaf, gate leg, etc.

(2) Carefully consider different types of chairs, having in mind good lines and comfort.

(3) Study good lines in furniture—ask or write for catalogs from furniture houses and study the same for ideas, prices, etc.

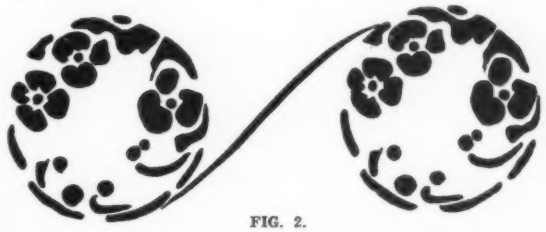


FIG. 2.

After looking around we found a circular drop-leaf table and chairs of the Windsor type, which for inexpensive kitchen furniture had remarkably good lines.

(III) *Planning the design:* We could not go beyond a simple border pattern running close to the edge of the table, but we wished to venture beyond the stereotyped conventional stripe. Our problem was to choose some delicate motif which would not be obtrusive and since the table was circular we used a small circle in which to work out a floral design in stencil form. After working

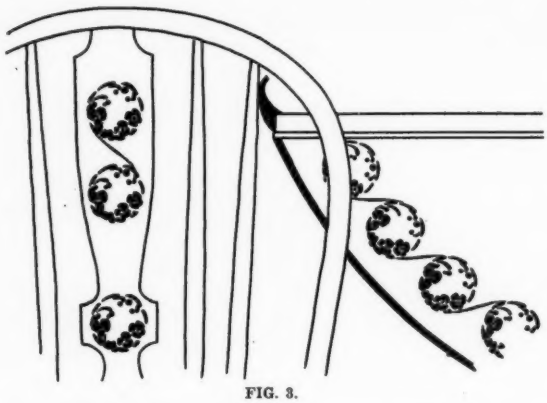


FIG. 3.

out several designs we chose the stencil shown in Fig. 1.

To set this off we decided to paint the edge of the table the same color as the stencil and to have this extend from the edge one-quarter of an inch in a narrow band around the top. To distribute the color slightly we added some to each of the three beads on each leg.

In attempting all such problems as above: First: Consider appropriateness; second: apply the principles of rhythm, harmony, and balance which are fully explained in many textbooks on design.

In treating the chairs, the flat piece in the back afforded opportunity for spotting our design. We found that adding the S curve enhanced the general effect. A slight distribution of the color on the back and rungs completed the chairs.

(IV) *Steps in applying the decoration* to the table top as shown in these plates:

(1) Stretch a string across the center of the table and parallel to the lines formed by the drop leaves.

(2) Mark a dot with a pencil 2¼ inches from each edge on this line.

(3) Stretch a string across the center of the table at right angles to the first string, using a steel square to get your right angle and mark dots 2¼ inches from each side as before.

(4) Bisect these right angles and mark dots 2¼ inches from side.

(5) The dots are now sufficiently close together to enable you to divide up the distance between and place other dots until they shall be equi-distant with about 3 inches between dots all around the table.

(6) With these dots as centers for the circular stencil adjust the stencil and brush on color.

(7) Add the S stroke as shown in Fig. 2.

(8) After the stenciled pattern has dried take a sheet of stiff mechanical drawing paper, lay partly over the edge of the table and press the paper against the edge of the table, running your thumb along, thus producing a circular crease in the paper conforming to the circular edge.

(9) Cut carefully on this crease with a pair of scissors.

(10) Adjust the piece which lies on the table and fits the circular edge and with a pencil gauge ¼ of an inch.

(11) Cut carefully on this line and replace this piece on the table top again so that a quarter of an inch of the top is exposed all along the edge.

(12) This can now be used as a stencil and the paint brushed on giving a clean cut band of color around the edge.

(13) Paint the perpendicular face of the edge. The general effect is shown in the sketch, Fig. 3.

SANTA CLAUS TOY

H. J. Meyer, Sheboygan, Wis.

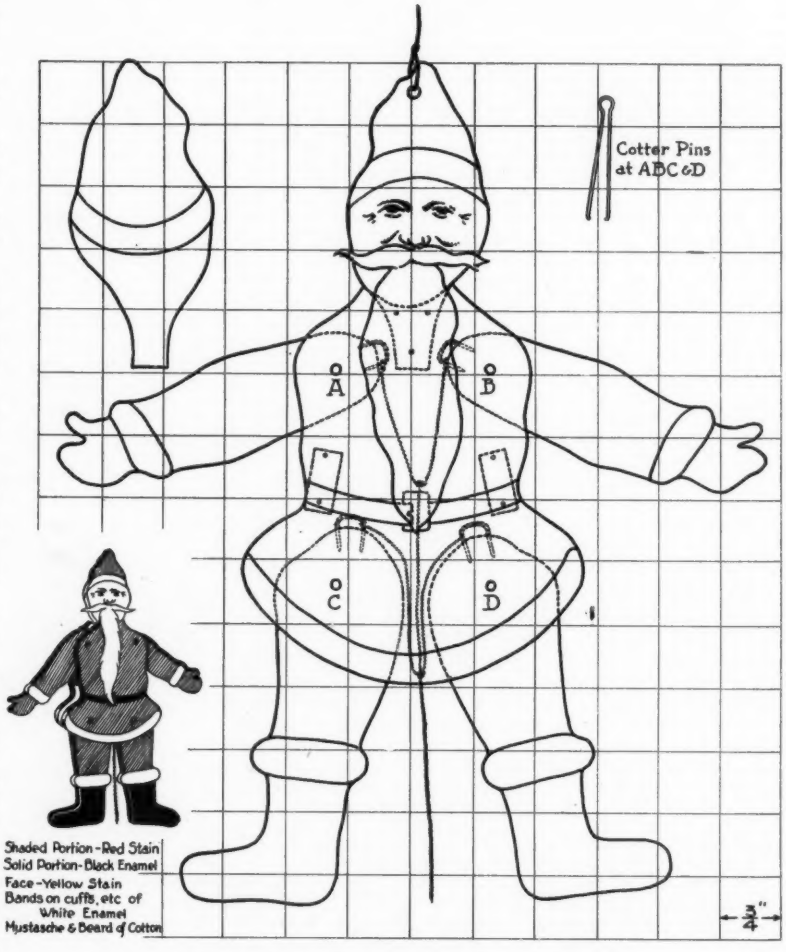
The old time jumping jack we used to make when a boy is still enjoyed by our youngsters. Many will recall the good old days when we used our jack knife, and secured our lumber supply from cigar boxes to make this project.

"Santa" a very interesting coping saw project may be made in the fifth to seventh grades. The two arms, two legs and two bodies should be made from 5-16" bass, and the head and two small blocks of ⅜" bass, so you have free motion of arms and legs.

All parts must be well sanded. Next paint the parts indicated with white and black enamel or paint. The rest of his suit is red with a yellow or flesh-colored face.

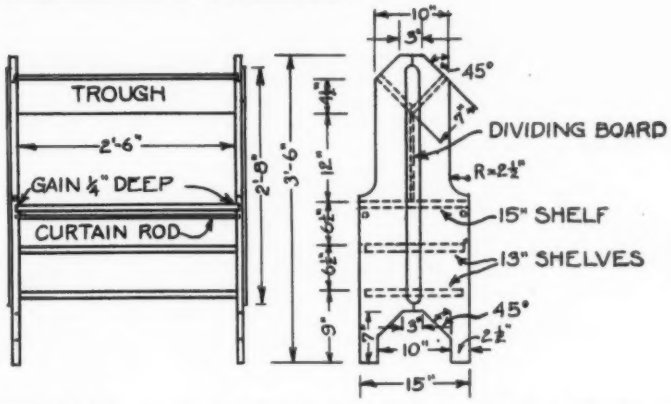
After drying, assemble the parts with cotter pins, using a fish line or strong twine to connect arms and legs as shown. Next glue on a mustache and beard using cotton or a like material.

If ever the spirit in some of your lower grade classes is waning, try this project "in season," and see what a stimulating effect it will have.



DETAILS OF A LAST-MINUTE SANTA CLAUS TOY.

A SIMPLE BOOK CASE



A COMBINATION BOOK-AND-MAGAZINE RACK

Edwin M. Love

To keep the favorite books in order and the popular, but usually unsightly magazines out of sight and yet accessible is the happy office of the combination rack herein described. The book trough and double shelf provide for a "five-foot book shelf" with some to spare; while ample room for magazines is provided by the two shelves hidden by the curtains.

The ends are made of Oregon pine, 1-inch stock, and are designed for widths of 8 inches. Smooth up the stock and cut to a length of 42 inches. Lay it off according to the dimensions given on the end elevation, remembering that this forms only one-half of one end. Cut to shape, and use as a pattern for scribing the other three pieces. When all have been cut, measure up from the bottom 22 inches and square a line across. Square another line ¾" below and gain out ¼" deep to receive the end of the book shelf. Gain grooves at the upper ends for the book trough, making the lowest point 9 inches from the upper end and forming an angle of 45 degrees.

For the trough use two pieces of pine, one 6¼ inches wide and the other 7 inches, both 30½ inches in length. When nailing together keep the heads of the nails back from the edge as far as possible, in order that the corner may be planed off to form a flat place ½" wide, against which the upper edge of the dividing board butts.

The book shelf is 15 inches by 30½ inches, and the magazine shelves 13 inches by 30 inches.

To assemble, slip the gains in the rack ends over the book trough and shelf ends, and nail in place. The magazine shelves can then be nailed into place with a minimum of trouble. The backing board of ½" stock 12 inches wide is secured by driving brads through the book shelf from below, and through the angle of the trough from above.

Hide the joints in the ends with ½" strips 2 inches wide, 32 inches long, and round off on both ends.

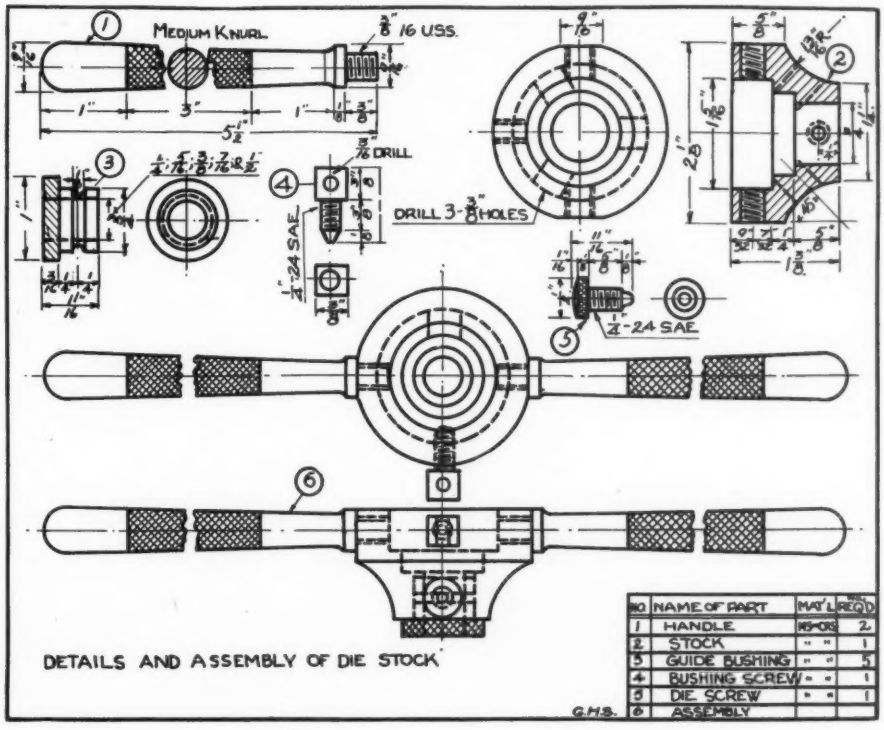
Provide the magazine section with curtains of scrim or other suitable material, hung on brass rods secured just below the outer edges of the book shelf. These curtains should be about 14 inches long.

Use a varnish stain for finishing, or stain dark oak, and give the rack a coat of wax.

DIE STOCK

G. H. Snaddon, Detroit, Mich.

The making of a die stock is an interesting and useful project for advanced students in machine shop practice. As shown in the drawing it consists of three main parts—the handles, the body, and the guide bushings. The handles are chiefly a lathe taper problem. The body



NO	NAME OF PART	MAT'L	REQ'D
1	HANDLE	R.R.O.S.	2
2	STOCK	" "	1
3	GUIDE BUSHING	" "	5
4	BUSHING SCREW	" "	1
5	DIE SCREW	" "	1
6	ASSEMBLY		

is made from a solid piece of machine or cold rolled steel, drilled and bored in the lathe chuck, then the outside turned on an arbor. Three holes are afterward drilled on the drill press, equally spaced and at a 45° angle so as to allow the chips an outlet, thereby preventing the clogging of the die and the consequent tearing of the thread. Care must be taken to get the holes for the handles drilled and tapped straight. Since best results are obtained by students in hand threading when guide bushings are used, a complete set has been included.

"GROWLER" FOR ARMATURE TESTING

B. B. Burling, Milwaukee, Wis.

A "growler" is almost as important to an auto-electric service station as a voltmeter. Its use in detecting armature defects is commercially well known and its construction can well be used in electrical work. Many opportunities are given through this project to discuss alternating current principles. The size of the growler depends to some extent upon the size of armature to be tested, and the data herein given is primarily for use in testing auto-starter and generator armatures.

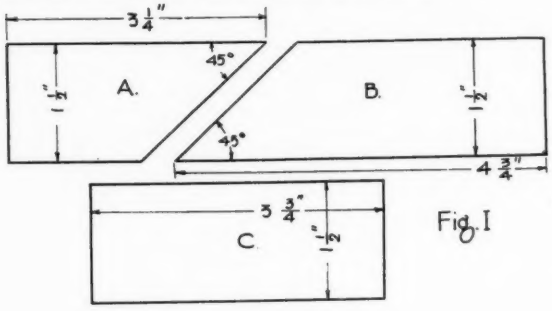


Fig. I

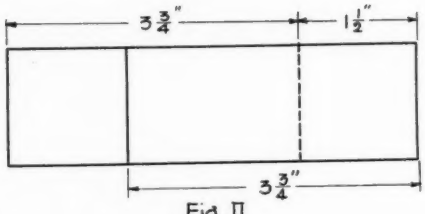


Fig. II

Core Construction

Use regular transformer steel if available, otherwise black stove pipe iron. Cut sufficient pieces of each kind as shown in Fig. I to make up 1½" of laminations when stacked under pressure.

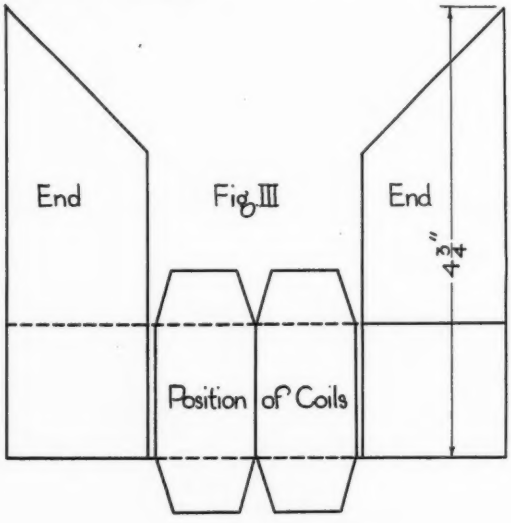


Fig. III

Core Assembly

In assembling the laminations stack the 3¾"x1½" pieces as shown in Fig. II making a pile which when placed in a vise will measure 1½". Before removing from the vise tape the middle portion. This will serve to

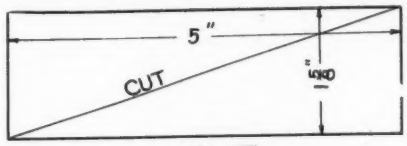
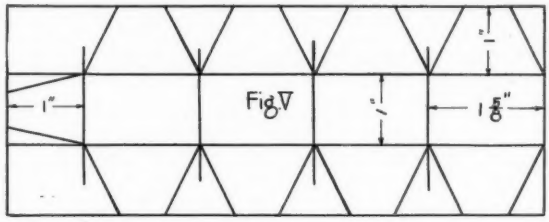


Fig. IV

hold the laminations in place. The end pieces as shown in Fig. III are to be placed in position by inserting the laminations piece by piece only after the coils have been wound and are in place.

Making the Wooden Mandrel

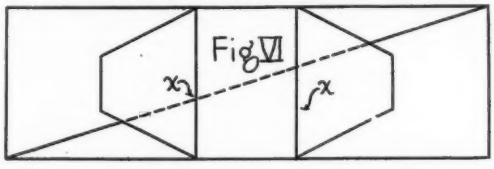
A mandrel upon which the coils are to be wound should be about ⅛" larger than the iron core upon which the coils are to be placed when finished. Fig. IV shows



such a square mandrel of five inches in length and cut so as to permit its being easily withdrawn after the coil is wound. This mandrel can be placed in a lathe or winding machine or used by hand.

Insulating the Core

Cut a piece of heavy insulating paper as shown in Fig. V, wrap about the mandrel and glue. Care should be taken to avoid gluing the paper to the mandrel.



After the insulating paper has been wrapped on the mandrel, as shown in Fig. VI, bind with wire at the lines marked X. This will not only hold the insulation in place but also limit and hold the first layer of wire.

The wires at X are to be removed after the winding is completed so it is well to glue the first layer in place.

Winding the Coil

Wind on 25 turns of No. 20 B. & S. gauge cotton enamel wire on the first layer, 24 turns on the second, 23 on the third, etc., until sixteen layers have been placed on the mandrel. If 26 turns can be wound on the first layer it will only be necessary to place fifteen layers.

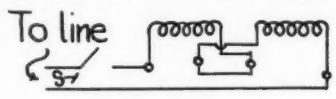


Fig. VII

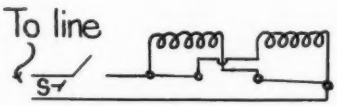


Fig. VIII

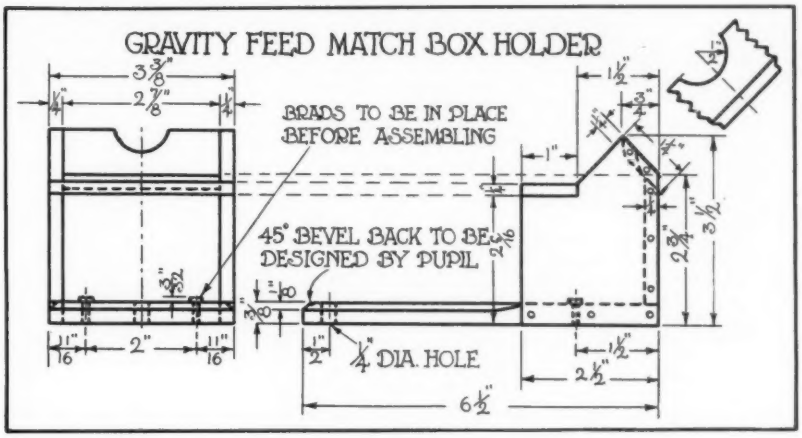
After the turns are all in place and the ends securely fastened, remove from the mandrel, fold the insulating paper back on the coils and tape sufficiently to hold same in place.

Make up two such coils. These coils are designed for 110 volt so the connecting of them in series will make it possible to use the growler on 220 volts A. C.

Terminal Connection

It is suggested that the coils be connected to terminals, as shown in Fig. VII, for 220 volts and as shown in Fig. VIII, for 110 volts.

After the core and coils are assembled, a wooden form should be constructed to protect the winding and to support the end pieces. Such a container nicely finished, with only the two end pieces, cord and switch showing will make a unit of equipment of which any shop should be proud.

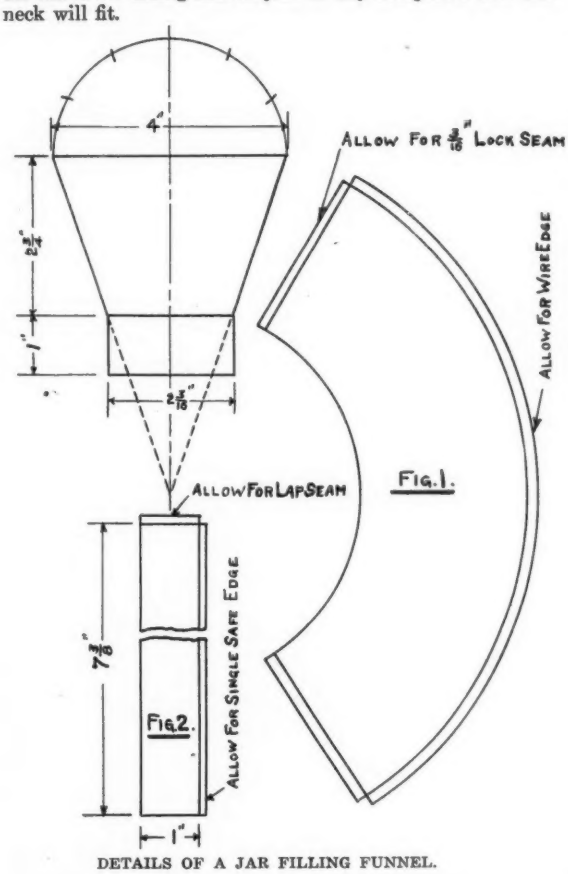


DETAILS OF MATCH BOX HOLDER.

A JAR FILLING FUNNEL

William X. Huber, Jr., Supervisor of Manual Training in the Radnor Township Schools, Wayne, Penna.

The funnel is made of bright coke tin or a light weight galvanized iron. It is a very practical project and suitable for a class or individual problem. Its greatest use is for filling Mason jars or any receptacle that the neck will fit.



DETAILS OF A JAR FILLING FUNNEL.

Operations: lay out Fig. 1, using wing dividers and scriber; cut out, fold ends in folder, shape over blow horn stake, and lock ends together using mallet and 3/16" hand groover. Then lay out Fig. 2, allowing ⅛" for lap seam and ⅛" for single safe edge; fold safe edge in folder, then roll in slip rolls, being careful to have the folded edge on the outside, and solder the ends together. Solder Fig. 1 and Fig. 2 together. Next cut wire, shape and finish the wire edge. A small wire loop may be made and soldered onto the funnel so that it may be hung up.

GRAVITY-FEED MATCH BOX HOLDER

Carl H. Oquist, High School, Bellows Falls, Vt.

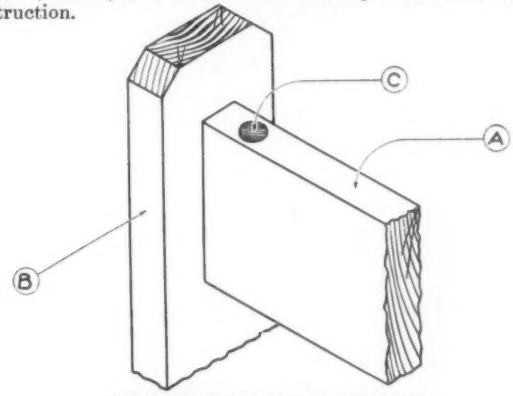
The gravity feed match box holder has proven popular with the pupils in both the junior and senior high. It is used in place of the usual large match box. While the best results are obtained with a fairly hard wood, pine is used where the holder is given as a class problem.

The action of the holder is very simple. When the match box is inserted, the cover is caught by the two projecting brads and the inside box forced down as far as it will go. The matches coming out of the box fill the hopper, the weight of the matches in the box keeping a constant supply on hand.

AN IMPROVED BUTT-JOINT FASTENING

Charles W. Frost, Bend, Oregon

The design of many pieces of furniture necessitates the use of screws to fasten horizontal to vertical pieces of wood; a typical example is the familiar taboret and small table with wide, thin legs, and rails forming a cross under the middle of the top. Unfortunately screws have very little holding power when used in the *end* grain, hence, this is an unsatisfactory method of construction.



IMPROVED BUTT-JOINT FASTENING.

The drawing illustrates parts of the let and top rail of a taboret in which this weakness has been overcome by gluing a birch dowel through the rail in such a manner that the screws (which hold "A" and "B" together) have a bearing in the *side* grain of a piece of hard wood half an inch in thickness.

This device converts one of the most frail joints used into a firm and satisfactory fastening for pieces not subject to excessive strain.

The dowel should not come through the top of the rail if the latter is visible in the finished piece. That, in the problem shown, is covered by the top of the taboret.

Explanation of Drawing

A—Top rail of taboret.
B—Leg of taboret. C—Dowel.

MANUAL TRAINING ROUND TABLE, K. S. T. A., HAYS, KANSAS

No program had been prepared for a manual training round table at the Hays meeting. However on the morning of the first day a group of enthusiastic wood-working pedagogs banded themselves, endeavoring to prepare some kind of a program and spread the news that a round table would convene.

As a result 22 presented themselves in the manual training department of the Hays Teachers' College. Prof. Ed. Davis, head of the department of woodworking in the Teachers' College was elected temporary chairman, and Mr. Cecil W. McKee of Beloit high school, temporary secretary.

The following program was presented and discussed successfully at the round table:

1. Should junior high boys be taught mechanical drawing?
2. What are practical and beneficial projects to put before junior high school boys?
3. Does the point system have a prominent value in manual training classes?
4. Do we try to make a technical course in our woodwork classes or do we aim to carry it only as a vocational guidance course.
5. Difficulties in artistic finishing.

After the above discussion the following officers were elected for next year: Chairman—Mr. J. W. Seuser, Hoisington, Kans.; vice-chairman—Mr. Sam Long, Almena, Kans.; secretary Mr. Cecil W. McKee, Beloit, Kans.

Correspondence to any of the above will be welcomed in regard to next year's meeting. Let's make 1925 K. S. T. A. Round Table a real one.—Cecil W. McKee, Beloit, Kansas.

INDUSTRIAL TEACHERS HOLD CONVENTION

The teachers and supervisors of vocational and industrial subjects in Wisconsin held a successful meeting at Milwaukee, November 6th and 7th, during the annual convention of the State Teachers' Association.

Men engaged in teaching vocational subjects met under the chairmanship of President B. E. Nelson of Stout Institute. The relation of vocational schools to city school systems was discussed by Mr. E. C. Bishop of Oshkosh. The training of teachers in the field was taken up by Mr. H. C. Thayer and Miss Grace Price. The problem of efficient administration was discussed by Mr. P. H. Graven of Madison.

At the session on Friday afternoon, Mr. Hans Schmidt presented a score card for rating teachers of manual arts, and called attention in an incisive way to the opportunities for self-improvement, which will result from honest self-examination. The tentative score card is as follows:

A TENTATIVE SCORE CARD FOR RATING TEACHERS OF MANUAL ARTS

1. Personal Equipment	150		
A. General appearance		33	
1. Dress			9
2. Carriage			9
3. Cleanliness			15
B. Health		38	
1. General			27
2. Deformities or infirmities			11
C. Voice		19	
D. Character		60	
1. Enthusiasm			7
2. Sincerity			7
3. Self-reliance			9
4. Initiative			13
5. Industriousness			11
6. Tact			13
2. Social Equipment	140		
A. Cooperation		35	
1. With fellow teachers			16
2. With authority			19
B. Loyalty		26	
1. To school			16
2. To community			10
C. Leadership		33	
1. In school			21
2. In community			12
D. Interest		24	
1. In school			4
2. In community			10
E. Sympathy		22	
1. Toward children			14
2. With educational problems			8
3. Professional Equipment	280		
A. Educational preparation		56	
1. General			21
2. Professional			19
3. Special			16
B. Practical experience and trade training		30	
1. Application to teaching			19
2. As a broadening influence			11
C. Grasp of subject matter		36	
D. Organizing ability		42	
1. In mass			22
2. Daily preparation			20
E. Use of English in classroom		22	
F. Response to suggestions		32	
G. Attitude towards research and experimental work		20	
H. Professional growth		42	
1. Study			26
a. Reading			9
b. Correspondence			5
c. Attendance at educational institutions.			12
2. Membership in organizations			16
4. Teaching Technique	250		
A. Clearness of aims and objectives		60	
B. Presentation of subject matter		75	
1. Organization			17
2. Presentation			22
3. Discussion			16
4. Application			20
C. Thought stimulation		50	
1. Motivation			20
2. Projects			19
3. Recitations			11
D. Integration		37	
1. Summarizing or "clinching"			22
2. Related subject matter			15
E. Attitude towards individual differences		28	
5. Shop Management	180		
A. Discipline		36	
B. Attention to hygienic conditions		22	
C. Alertness of instructor		22	
D. Class routine		19	
E. Shop organization		81	
1. Orderliness			14
2. Cleanliness			12
3. Condition of tools			20
a. General			9
b. Individual			11
4. Condition of machinery			16
a. Arrangement			3
b. Upkeep			7
c. Safety			6
5. Care of supplies			12
a. Arrangement			7
b. Records			5
6. Use of industrial and material exhibits			7

Total Score

1. Personal Equipment	150
2. Social Equipment	140
3. Professional Equipment	280
4. Teaching Technique	250
5. Shop Management	180
TOTAL	1000

Mr. F. M. Karnes of Oshkosh discussed the opportunities for counciling in secondary schools.

The session was closed with papers by Prof. A. H. Edgerton of the University of Wisconsin and Mr. R. H. Rodgers of the Milwaukee Vocational School.

BOSTON SOCIETY OF VOCATIONAL EDUCATION MEETS

"Vocational education, so recently an experiment in the public school systems of this country, has accumulated a body of fact and of experience which should weigh largely in shaping its future policies. The literature extant upon the subject deals almost entirely with the philosophy of vocational education. It is now time for a new literature to appear, chronicling the results which have been attained, and making them available as a basis for progress."

This is the text upon which Professor Herbert Blair, of the School of Education of Boston University, addressed the Vocational Education Society of Boston, at its monthly meeting Saturday, November 15.

Professor Blair's own experience has made him a propagandist of vocational education, and has given him an exceptional acquaintance with some of its phases. A superintendent for many years in communities where most of the pupils came from poor homes, he was impressed with the contrast between the public expenditures for the minority who go to high school, and those for the great majority of youth who go to work. In 1916, he went to New York City to take part in the survey of trade education made by the New York Industrial Commission. Later, he spent two years in the service of the Federal Government, supervising and investigating the immense rehabilitation training program for ex-soldiers in all parts of the United States.

Professor Blair was forced to conclude that results do not always square with theories or with **a priori** judgments. He found that in one trade school for boys, the avowed purpose of which was to train for industrial placement, only 28 per cent of those pupils who entered the two-year course graduated; and of those graduates, not more than one-third—or nine per cent of the entrants—actually entered the industry for which they had been

trained. These figures are not more startling than those from other schools of the same kind which came under Professor Blair's observation. However, he cited high schools of the technical or manual training type, whose graduates entering industry on the basis of the training received in them were so rare as to be incalculable in percentages.

By way of contrast, Professor Blair mentioned the apprentice school maintained by New York Typographical Union and the employing printers' organization in that city. Of the class which entered in 1912, 65 per cent had become journeymen printers in the same union by 1917. Presumably others, who had left the city, were also in the occupation for which the school had trained them.

The rehabilitation training of ex-soldiers, said Professor Blair, presents so many unique features that it is hardly comparable with trade-school training for minors. However, its results can and do emphasize the value of definite data in any type of education.

The training pay allowed by the government was at first so low that all the ambitious men wanted short courses, of three or six months. Later, the pay was raised to a point where it constituted an incentive to remain in training as long as possible. In either case, real vocational selection or guidance did not enter into the choice of courses.

Practically every type of school which had the facilities and the willingness, was enlisted by the government in the rehabilitation training program. The results varied widely between schools, and for reasons which were sometimes hard to discover. One school in three and one-half years had turned only five per cent of its trainees into the trade; the most successful—which by the way is a privately endowed institution—had in the same period of time placed 75 per cent of its graduates in industry. One school offering a six-months' course in electrical work had a far better record of placements than did several others offering much longer courses in the same trade Professor Blair did not, however, assume that this is an argument for brief courses in public trade schools. Wide divergences in the schools' organizations and methods made such generalizations unsafe. In general, the schools which succeeded best in training ex-soldiers were those which already had successful experience in teaching trades, which had their own regular students to set the pace for the soldiers, and which had facilities for placing their graduates in employment.

In conclusion, Professor Blair emphasized the fact that we need more data. There is little excuse for theorizing now, he said. Every vocational teacher has data of his own. By making these facts available for comparison, definite conclusions can be arrived at. It is already possible to affirm that the kind and the length of training depends on the trade and on the individual. A stock-length course for every pupil in any trade whatsoever is unjustifiable. Unjustifiable, too, where it exists, is the failure of a vocational school to send a large proportion of its graduates into the trades trained for. Every industry has places for the dull as well as for the bright pupils. It is the school's business to establish the connection, not for some, but for most.—Frederick Ames Coates.

THE SCHOOL CRAFTS CLUB MEETING
Officers for 1925 Installed

The November meeting of the School Crafts Club of New York City and vicinity proved to be of special interest. A large group of men attended. The club gathered on the evening of November 18th, at the Geneva Restaurant on West Forty-fourth Street. Following a hearty dinner, two excellent speakers were listened to. The evening wound up with the installation of officers for the ensuing year.

Dr. Thomas Travis, pastor of the Watching Congregational Church in Montclair, N. J., gave a talk illustrated with moving pictures, on the subject, "Hunting and Fishing in the Tall Timber." Dr. Travis is a great lover of outdoor life, especially of the woodlands. Three reels were shown, entitled:

1. Hunt for the Great Bull Moose.
2. Salmon Fishing with Rod and Reel.
3. Riding the Wild Bull Moose.

Mr. Herbert W. Dutch, principal of the Montclair high school, Montclair, N. J., spoke on the subject, "New Things in Education." Mr. Dutch paid a compliment to the School Crafts Club in saying that its members were doers and not hearers only. There is a tendency on the part of educational administrators to get away from the formal book learning, which was intellectual training only. Now we have a different outlook. We are making

FRED C. ARNOLD,
President School Crafts Club,
New York City, N. Y.

a study of the child, not the subject alone. The individual is getting more and more consideration.

We have to consider seven cardinal principles of education: health, leisure, homemaking, citizenship, personality, character, and vocational training. It is impossible to outline a course in personality for instance. These factors must be woven into the school life as a whole. We are still in the dark as to the proper way to develop a child according to all seven principles. Means in many cases are brought out accidentally. Before, the church and home have been held responsible; but the state has recognized that the school must aid in broadening out the abilities of each individual in order to make better citizens. The school has failed as a whole to bring out more than intellectual training.

The high school in Montclair has had a great many activities. Mr. Dutch has made a study, hoping to use them in developing the seven cardinal principles. He spent a good deal of time trying to formulate justification of some of the courses.

He tried to formulate a definition for education. Three definitions that have been heard are:

1. Education is the control of conduct in a large sense.
2. Education is learning to do better those things that we are going to do anyway.
3. Education is the acquirement of experience, in which the teacher's part is guidance.

Mr. Dutch believes the last to be the best approach. Experience is as broad as human adventure. We have been trying to acquaint youth with past experience for years. We learn by doing, think by thinking, and live by living in life itself. The school must be true to life.

After the talk given by Mr. Dutch, the new officers of the School Crafts Club were installed. The new president, Mr. Frederick C. Arnold, in taking the chair, urged the club to try to solve some real problems this year for the betterment of the teaching of industrial arts in our schools. Can we help to develop some or all of the cardinal principles?

Two new members were received into the School Crafts Club: Mr. Louis T. Schiff, New York City, and Mr. L. V. Clew, Elizabeth, N. J.

—Lloyd F. Stair.

THE FIRST MODEL DOMESTIC SCIENCE COTTAGE AMONG THE HIGH SCHOOLS OF WEST VIRGINIA

The first cottage for the use of Domestic Science to be constructed in West Virginia was just finished at Point Pleasant. The cottage was built and equipped with the idea of placing the work in Domestic Science and Art under conditions as similar to home surroundings as possible.

The building is a one-story frame construction and cost approximately $4,500. The work is organized under the provisions of the Smith-Hughes Fund and two teachers are employed.

The one outstanding feature, perhaps, of the building is found in the four unit kitchens arranged in separate and distinct groups. Each kitchen accommodates from four to six girls.

All first and second year girls in the high school are required to take the courses in Clothing and Cooking and other related Domestic Science subjects.

In addition to the four unit kitchens, which are nine feet by eleven in size, the building has a large sewing room 20x30 and an adjoining fitting room. It contains a living room 11x18 feet, a model bed room 11x12 and a bath room 6x8. A small office for the supervisor is located in the center of the building. The basement contains a laundry 11x16 and a furnace room.

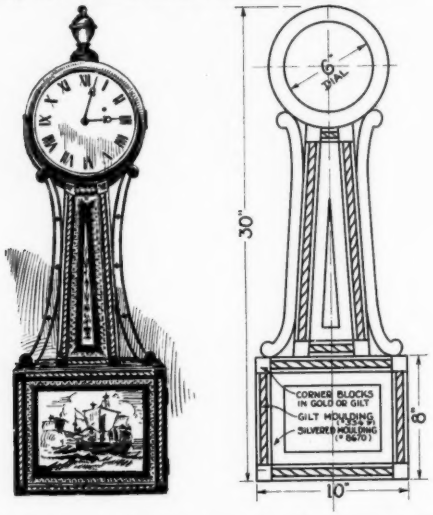
NOW, ARE THERE ANY QUESTIONS?

Colonial Banjo Clock

Q. 478. Can you tell me where I can obtain drawings of Banjo clocks? Also information on the works, the painted glass, etc.—W. E. W.

A.: Mr. Frederick J. Bryant of Auburn, Me., has kindly supplied the following information for the benefit of the questioner:

"The accompanying sketch will convey general information on the size, proportions, and finish of a banjo clock. A complete detail drawing and complete directions for the making of a clock will be found on pages 36 and 47 of 'Working Drawings of Colonial Furniture' (Bryant), published by the Manual Arts Press, Peoria, Ill.



"A fine banjo clock movement which runs on weights only can be purchased from Mr. G. R. S. Killam, 17 Summer St., Pawtucket, R. I. It will cost about $15.

"The Sessions Clock Co., Forestville, Conn., manufactures banjo clocks and may be willing to sell the movements of other parts.

"Miss Sinco, 26 Bromfield St., Boston, is an expert in painting colonial pictures on glass and maintains a studio at the above address. It will cost about $4 to have her paint a colonial scene on glass.

"The Decorators' Supply Co., Archer Ave. and Leo St., Chicago, Ill., can furnish a number of different patterns of borders for decorative purposes. On the pencil sketch I specified a few of the catalog numbers which will do for a banjo clock."

Mahogany Stains

Q. 486. I have a finishing problem that has been bothering me for some time. Probably you can solve it for me. It refers to the use of mahogany oil stain. I find that whenever I varnish after having used this stain, the red color will always appear on the varnish brush. Or in other words, the stain does not dry right. This does not occur with the other colors of oil stains. Why is this? I have waited some times as much as a week between staining and varnishing with the same results.—W. C. E.

A. Wherever a spirit of oil stain is used, "bleeding," as it is known in the trade, will always occur. The amount of time allowed for drying in no way affects this condition. The turpentine in the varnish, as well as the varnish body itself, exerts considerable solvent action on the stain, with the result that it is lifted and subsequently works into the varnish coat, producing a characteristically uneven and blotchy effect. Various undercoaters, such as shellac, lacquer, etc., have been tried with more or less success, but unless applied with the spray gun over the dried stain-coat, bleeding is almost certain to occur. Brushing does not take part in the spray work of course, and for this reason the stain is little disturbed in the latter process. At best this treatment is but a makeshift since the only rational method is to employ a proper water soluble stain which is practically free from all "deviltries" of this work. To my mind the most objectionable feature of all—typical of spirit and oil soluble anilines—is the fact that they are fugitive to light and hence quickly fade out to all colors but their original tone. Water soluble stains are easily mordanted or "set" and hence, when the work is done the first time, it is as permanent as it is possible to be made.—Ralph G. Waring.

Ebony Finish

Q. 487. Would you be kind enough to tell me how to put a black finish on a piano bench made of poplar in order to harmonize with a piano with ebony finish? The bench is still in white wood.—H. H.

A. In preparing the piano bench of poplar for an ebony finish the following will be of value:

Sponge the wood with clear, warm water to raise all grain, dry and sand smooth with worn out 00 paper, being very careful to round all sharp edges at least $\frac{1}{16}$ of an inch. This will in no way affect the clean cut appearance of the cabinet work, but will in some measure prevent edges from chipping and wearing white in future use. It would be preferable to make this particular job of birch because of the relatively hard use which it will receive.

To procure a black stain dissolve two ounces of tannic acid in one gallon of water, or proportion, and apply thoroughly to the whole piece with a clean brush. Be very careful to avoid touching the work which would otherwise become spotted at those points. Dissolve the stain in enamelware or glass only. Make a second solution of two ounces of copperas in one gallon of water, or proportion, and apply after the first coat has dried. Let stand 24 hours until a full black tone has developed.

Apply a coat of orange shellac shaded with spirit soluble nigrosene to a jet black as a very thin wash coat, the solution of which should not be thicker than water.

When dry and hard, sand with a split 6-0 paper, dust off and brush on a coat of Pratt & Lambert's Black Effecto Auto Enamel, which is a varnish goods of great durability, depth and brillancy. Let dry three days in a warm room and water sand with Minnesota Mining Co.'s 6-0 wet or dry finishing paper. Be very careful not to sand through the varnish coat. Repeat for three or four coats, rubbing the last two with felt pad, FF pumice stone and water to a true, even surface free from nibs or brush marks.

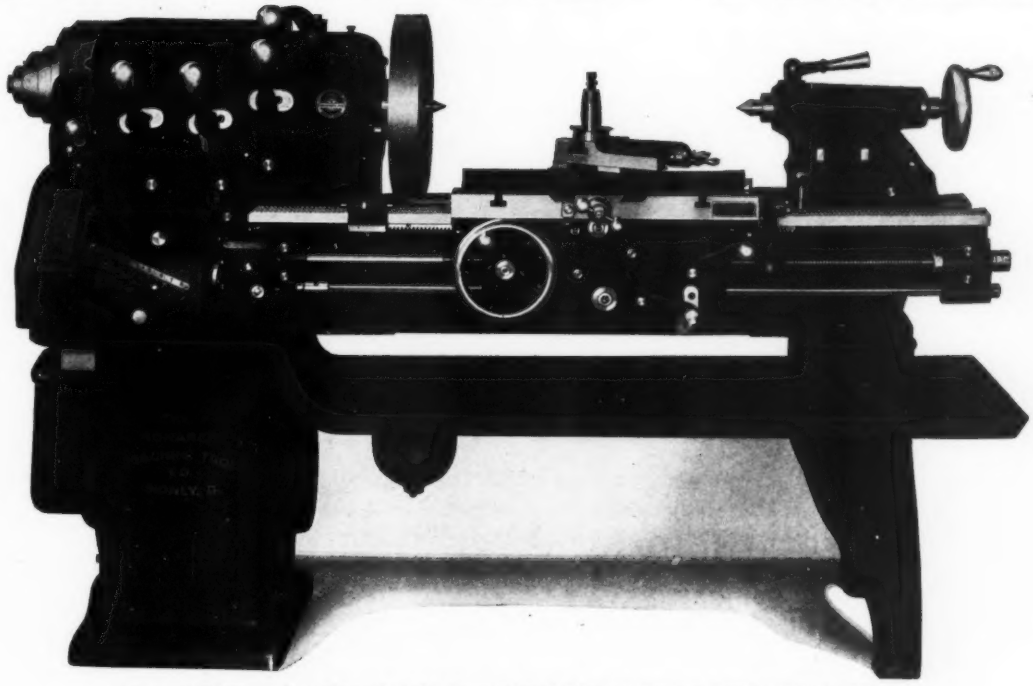
After rubbing the last coat allow at least two weeks in order to prevent cloth printing through use.

It has been my experience that a two inch soft pad brush such as a fitch, skunk, or bear bristle is ideal for a job of this kind.—Ralph G. Waring.

Christmas Work of the Hartford, Wis., High School. Every year at Christmas time the Hartford high school does its best to bring a little Christmas cheer and happiness to the community. The names of needy people are obtained from the different churches and Christmas baskets are sent to the people who are deserving and appreciative of them. Each row is assigned one article to contribute towards filling these baskets, they are finally filled by the domestic science department, and delivered by the boys. Such things as sugar, salt, nuts, raisins, fruit, breakfast foods, potatoes, flour, meat, candies, wearing apparel, games, and toys are put into such baskets. Another way the school has of spreading Christmas cheer is in the form of a community Christmas carol entertainment. All the people of the city are invited to it to help make it a big success. People from the various schools and churches contribute to the entertainment by giving instrumental and vocal numbers, Christmas stories, and familiar Christmas songs and carols.

This year the domestic science department has decided to do even more and is planning to make over old clothes for needy children and give them Christmas presents. This is Hartford's way of helping to bring "peace on earth to men of good will."

Silent - Smooth - Powerful



14" x 6' Monarch 8 Speed Self-Contained Motor Drive Lathe With Chrome Nickel Steel Helical Gears and Ball Bearings in Headstock. Motor and All Wiring Inside Cabinet Leg.

These MONARCH lathes are the very last word in design and efficiency and adaptability for Vocational School use. The helical gears in the headstock are absolutely noiseless. Four large ball radial and six ball thrust bearings in the headstock eliminate friction and prevent wear.

The motor is mounted inside the cabinet leg where it is protected from oil and dirt, and all electrical wiring and connections can be housed inside the cabinet leg. Drive is through endless belt with adjustable ball bearing idler pulley.

The only noise made by the helical geared MONARCH lathe is the swishing of the oil in the headstock. Operation of the entire lathe is fool proof. If desired a heavy glass cover plate can be put on top of headstock making the inside visible.

MONARCH lathes are standard equipment in many of the best production shops and tool rooms. Our large production enables us to offer these lathes as the very finest lathes ever offered for Vocational School use and at prices within the appropriation limit of those schools desiring good machine shop equipment.

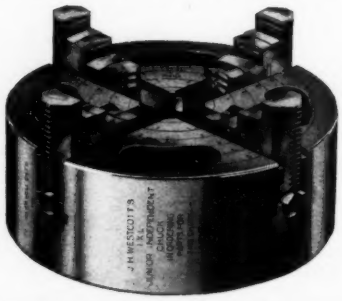
We will gladly send you catalogue and special bulletin describing these new lathes.

America's Largest Builder of High Grade Lathes

The Monarch Machine Tool Company

404 OAK STREET SIDNEY, OHIO.

WESTCOTT'S IXL JUNIOR
Independent Lathe Chuck



Especially designed for use in manual training schools and on light lathes in industrial machine shops

WESTCOTT CHUCKS

Have been designed with this idea dominant:

That they should at all times give adequate service, not forgetting the extra strains to which Chucks and lathes are so often subjected.

Young machinists who are starting out in their careers are quick to perceive the qualities of WESTCOTT CHUCKS; men who have "grown up with the firm" saw the same qualities years ago and know that WESTCOTT CHUCKS today set the standard by which others are judged. A list of users of our equipment looks like a Social Register of the Country's manufacturers—why not give the boys in your schools an opportunity to become acquainted with WESTCOTT tools?

Send for complete data to

WESTCOTT CHUCK COMPANY, Oneida, N. Y.
Manufacturers of Lathe and Drill Chucks since 1873

SPUR GEARED SCROLL COMBINATION LATHE CHUCKS—IXL REGULAR AND JUNIOR INDEPENDENT LATHE CHUCKS—SPUR GEARED UNIVERSAL LATHE CHUCKS—DOUBLE GRIP, AUXILIARY SCREW AND IMPROVED DRILL CHUCKS.

NEWS NOTES

Schenectady, N. Y., is maintaining vocational night schools. For men the following courses will be offered: practical woodworking for both apprentices and journeymen who are anxious to perfect themselves in the special features of building construction and inside furnishing; Sheet metal pattern and lay-out work for apprentices in the sheet metal trades who are required to attend; machine shop practice; mechanical drafting; machine shop mathematics; blue print reading and other courses for which there is sufficient enrollment.

The board of education at Charleston, W. Va., has recognized vocational training. Classes covering some of the principal trades have been introduced.

The vocational school at Paterson, N. J., is to be enlarged. The present courses include study in paper hanging, carpentry, plastering, and electricity.

At Two Rivers, Wis., part time vocational classes have been established. These are in charge of A. A. Kruschke, director. The girls are also given instruction in cooking, hygiene, household sanitation, home nursing, first aid, infant care, house planning, house furnishing, clothing, millinery and nutrition. The boys are given a shop course in which they have a choice of printing, sheet metal working, drafting, cabinet making, and auto mechanics.

In New York City several labor unions have voted to support the vocational schools. The classes in operation included courses for plasterers, upholsterers, sheet metal workers, photo-engravers, carpenters, cement workers, painters and decorators, electric wirers and bricklayers. The registration for these studies runs to about 4,000 students.

El Paso, Texas, has opened a vocational school. Instruction will be given in auto electricity; mechanical drawing; special Ford mechanics; carpentry; mill work; machine shop practice; printing; dressmaking and millinery.

Vocational evening classes have been established at Wilmington, Delaware.

The latest innovation at the Irving-Opportunity school, Oklahoma City, Okla., consists of the installation of a paper box factory. The work is in charge of W. S. Rosamond, vocational director.

The board of education at Sacramento, Calif., has decided to establish printing classes. Agreement was reached by President William A. Meyer of the board of education and the allied printing trades whereby these classes will have the support of the printing industry.

The De La Howe state school, Willington, S. C., said to be the oldest manual training school in America, opened its 1924-25 session. The school was founded in 1796 by John de la Howe.

At Fond du Lac, Wis., the evening auto-mechanics classes have proven quite popular. Those intending to do garage work will receive special attention. A printers' class is also proving itself popular.

John W. Ferguson, an engineer at Paterson, N. J., recently pointed out the success attained in the bricklayers' course at the vocational school in that city. The class has 54 students and runs a course of twenty weeks.

The Grand Rapids, Michigan, vocational school has begun foremanship classes under the direction of Arthur Dodge. Study of factory cost, organization, duties of foremen, handling of men, management methods and technical problems in furniture manufacture and metal trades will be included.

The vocational school at Milwaukee, Wis., is attended by 24,000 part time students this year. The third and final unit of the school is now under construction and when completed the plant will represent an investment of $3,250,000.

Art Classes Make Christmas Cards. Christmas greeting cards were made by the pupils of the art class in the Johnson high school at St. Paul, Minn. A committee of three was selected to arrange for the printing of the cards. The best cards in the lot were selected for engraving, and

(Continued on Page 22a)

COLUMBIAN
UNIVERSAL VISES

Will hold work at any angle and are quick-acting in every position

They are used by cabinet and patternmakers in woodworking shops everywhere.

Students should learn to use these vises which they will find in industrial plants after leaving school.

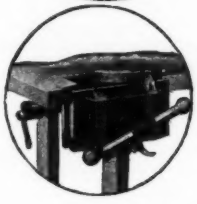
Every Manual Training Instructor's Bench should be equipped with Columbian Quick-Acting Universal Vises.

Made with two sizes Jaws, 7X16 or 6X12 inches. Either size made to open 12, 16 or 20 inches

Showing Various Positions

1. The entire vise swung around so that the jaws are horizontal. The two hand-nuts lock the vise rigidly in any desired position.

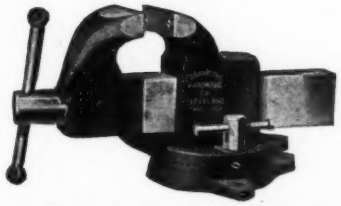
3. With the vise swung at an angle, work can conveniently be held flat on the bench.



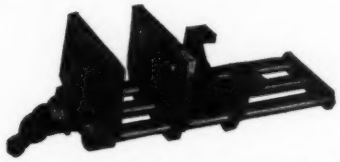
2. Using the dogs to hold a curved segment. A light tap on the bottom of the dog brings it up into place.

4. The Columbian Universal Vise rotated so that the ends of the jaws are above the bench level.

A Type to Meet Every Requirement



Columbian Malleable Iron Machinists' Vises will give real service. Made in all standard types and sizes.



Columbian Manual Training Vises are widely used in all wood working industries. Choose the style and size to meet your needs.

Columbian Forged Steel Leg Vises have been a standard in iron working, structural steel and blacksmith shops for years. They are built to withstand the most severe usage.

INSTRUCTORS:

A copy of our complete catalog will help you in planning your future equipment. Send for one.

The Columbian Hardware Co.

World's largest makers of vises and anvils

CLEVELAND **OHIO**

Are the BEST TOOLS too Good for the Beginner?

When you learned to ride a bike, you begged or borrowed from one of the kids, an old wheel to practice on. That is, you did if you were wise.

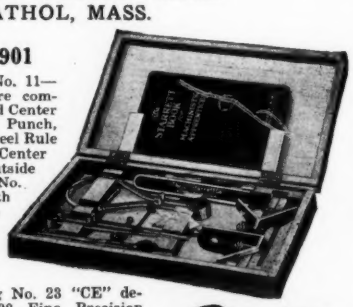
But you can't learn a trade that way. You must have ***accurate*** tools to do accurate work and any mechanic will tell you so. That's why crack machinists advise the youngster to start with his own kit of Starrett Tools—the same fine tools they use themselves. In the No. 901 Apprentice Set you get the start of a kit of well-made, accurate tools that you'll use the rest of your life. The set is contained in a handsome nicely finished wood case and is sold by good hardware stores everywhere. *At* a price which is not the least attractive feature of this splendid kit.

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled

ATHOL, MASS.

STARRETT
Apprentice Set 901



Set No. 901 consists of: No. 11—6 inch Combination Square complete with Sliding Head and Center Head, No. 117 B, Center Punch, No. 320, 6 inch Flexible Steel Rule in Pocket Case, No. 390, Center Gauge, No. 79, 6 inch Outside Caliper with Solid Nut, No. 73, 6 inch Inside Caliper with Solid Nut, No. 77, 5 inch Divider with Spring Nut and The Starrett Book for Machinists' Apprentices, Vol. I.

Write for Starrett Catalog No. 23 "CE" describing the uses of 2200 Fine Precision Tools. Free.

7426

Starrett Sets

(Continued from Page 20a)

were later tinted by the class. The proceeds were used for the purchase of materials not at present available for art work.

Minnesota Industrial Teachers Meet. At the recent meeting of the general industrial training department of the Minnesota Educational Association, Mr. L. F. Knowles, of the Johnson high school, St. Paul, was elected president, and Mr. J. R. Hall, of the same school, was elected vice-president. Mr. H. R. Hund, of Minneapolis, was elected secretary. The association had an attendance of between 250 and 300 teachers.

School Art Work Exhibit. At the next annual meeting of the Department of Superintendence of the National Education Association, it is planned to devote a part of the program to the consideration of "beauty and happiness in education."

The Association has invited schools to exhibit examples of work indicating joy of working with beauty as an ideal. The exhibit will comprise examples of work in poster-making, construction work, craft work and community projects. Through this means there is offered an unusual opportunity for promulgating the ideas of art and vocational activities.

Civil Service Examination. The United States Civil Service Commission has announced an open competitive examination for the position of industrial educationalist.

Illinois Manual Arts Meeting. The Illinois Manual Arts Association will hold its next annual meeting February 12-14, at Chicago, Ill., in connection with the meeting of the Vocational Education Association of the Middle West. It is expected that all manual arts teachers of the state will be represented at this meeting. The committee has arranged a special "Illinois day" in connection with the meeting.

"Tiny Town" Again. "Tiny Town," the miniature modern, model city, originated at Springfield, Mo., in 1919, will be repeated next spring on a more extensive scale. Readers will recall the splendid success and resultant nation-wide publicity attending the first and original realization of the Tiny Town idea, which was designed to encourage and stimulate building delayed by the world war.

It is planned to reproduce the miniature city in 1925 on a scale of one inch to the foot, and to provide as much open ground as necessary to create every feature of a modern city to include proper lighting and landscaping. All structures will be painted or waterproofed.

Tiny Town will be managed by officials selected from the student body of the Springfield public schools, who will formulate ordinances and establish departments of police, fire protection and sanitation. A number of prizes will be awarded in connection with the exhibit, and there will be a spring show of building materials entering into construction work. It is expected that the commercial exhibit will meet the expenses of the affair.

Men Needed in Industry. The National Industrial Conference Board of New York City has begun an investigation of the chief basic industries of the country to determine how engineering education may best be adjusted to meet industrial needs. It is estimated that the country needs 400,000 more persons for this type of responsible position in 1930 than in 1920. The board has selected for study, ten or twelve major branches of American industry in order to find what technical men are now in industry, what positions they occupy, what their activities and opportunities are, and in what respect the technical colleges are adapting their programs to the practical requirements of industry.

The board has completed the first two of the series of investigations covering the rubber, pulp and paper industries, which will be followed immediately by a study of the textile industry, and later studies of the metal trades, and chemical and automotive industries. These studies will form the basis for determining the men needed for executives, administrative and technical positions.

Haney Tablet Dedicated. A memorial tablet in honor of Dr. James Parton Haney, former director of art in the New York City high schools, was dedicated November 16th, at New York University, in the presence of a large gathering of friends and associates. The tablet has been installed in an alcove of the University library. A fund is to be created for the purpose of placing art books in the alcove, which will be known as the Haney Art Library. The

(Continued on Page 25a)

STANLEY

STANLEY SW

"Everlasting" Chisels

Head, Shank and Blade are forged from one piece of tool steel. Insures great strength and durability. Provides maximum of efficiency, as a blow on the head is transmitted directly to cutting edge.

Leather washer between handle and steel head serves as cushion, thereby relieving handle from shock. Handle of selected hickory, fitting snugly into ferrule.

STANLEY
NEW BRITAIN, CONN. U.S.A.
THE STANLEY WORKS — THE STANLEY RULE & LEVEL PLANT

(Continued from Page 22a)

tablet is enhanced by a portrait in relief of Dr. Haney, modeled by Chester Beach, a well-known sculptor.

Will Conduct Trade School. A vocational school has been established in the high school at Sidney, O.

Vocational Work Grows. Excellent progress in vocational work has been reported in the schools of Sebring, Fla., by J. G. Smith, instructor in this branch. The boys made tables for the electric sewing machines of the home economics department. Other small tables, with drop leaves and shelves underneath for books were made. The class also did some needed repair work around the school building, including carpenter work, glass cutting and fitting, and the construction of a bicycle rack.

In addition to this work, the boys have also studied cattle breeding and judging. They have made visits to all the dairies in the vicinity, and are well up on the practical points in estimating the value of cattle.

Build Equipment for School. During the past summer, the boys of the McKinley high school at Canton, O., saved the school board nearly $3,000 by building the equipment for three rooms in the school. The boys took the lumber from the mills, cut and dressed it, and made it into tables, cabinets, lamps and desks. The boys worked under regular commercial conditions and were paid 25 to 40 cents an hour.

Apprentice Training Offered in 41 States. In a recent statement, Mr. Frank Cushman of the trade and industrial department of the Federal Board for Vocational Education, declared that trade classes for apprentices are now in operation in 41 states of the Union. During the past year the work in apprentice training has reached 20,000 men and boys in the building trades, divided among students and apprentices in day-trade schools, employed persons and journeymen in the trade. Mr. Cushman's figures did not take into account the classes conducted by the master plumbers, painters and decorators, or the tile and marble-setters' associations. More trade bodies must cooperate in the work before there will be sufficient apprentices to replace skilled mechanics who annually die or retire.

Home Making Cottage Opened. A model home making cottage was opened at the Cudahy Vocational School, Cudahy, Wis., during the week of October 20th. Members of the board of education, the board of vocational education and teachers of the school attended a supper served by the girls of the cooking classes of the school. The festivities took place in the model home which had been painted and decorated by the girl pupils of the school, under the direction of the home making department. Mr. George P. Hambrecht, director of vocational education for the state, was the principal speaker, taking for his subject the training of apprentices in the trades.

Vocational Education in the State. Twenty-five schools in Wyoming are offering vocational agriculture. Two new schools, namely Newcastle and Gillette, have been added to the list. At present the enrollment is approximately 600 students.

Trade Teachers Denied Outside Credit. Trade experience rendered outside the New York City public school system by teachers of vocational subjects will no longer be credited toward retirement, as a result of the retirement board's decision to deny all claims for modification of prior service allowance crediting such service. Should the retirement board be upheld in its contention, every vocational teacher in the school system receiving credit in the past for outside experience, will have that allowance deducted from his service allowance.

Build School Furniture in Shops. Library study tables and chairs for the new high school at Beardstown, Ill., were recently completed by the boys of the manual training shop at a considerable reduction in cost over the manufactured product. Two large study halls, one for the freshmen and sophomores, and one for the juniors and seniors were equipped with the tables and chairs. In all, fifty tables were installed in rooms accommodating 100 persons. The work was carried out by the manual training boys, under the direction of R. G. Alcock, supervisor of the shop.

New Vocational Program. A comprehensive program for vocational guidance is being tried out at the Brooklyn Continuation School, under the supervision of Mr. I. D. Cohen. Under the plan, a complete development of the needs, values, working conditions, opportunities and salaries paid in the various occupations is offered to enrich the pupil's knowledge and to assist him in choosing a vocation. The latter part of the work consists of a study of the principles involved in choosing a career, such as health

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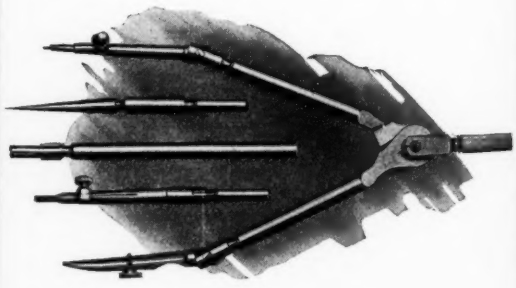

WEBER
Cataloged Drawing Materials

Vocational School Dedicated. The new vocational school at La Crosse, Wis., was dedicated on November 20th with appropriate exercises. Supt. B. E. McCormick of the local schools, presided, while George P. Hambrecht and William Luening delivered the principal addresses.

Endorse Trade Training. The building trades council of Syracuse, N. Y., has recently endorsed the local continuation school as a training center for apprentices. The council adopted a resolution, urging that employers compel the attendance of apprentices at evening vocational schools.

Cooking Course. A class in cooking has been established in the evening school conducted at the Central High School, Erie, Pa. Miss Verna Criss is the instructor.

Printing Plant Installed. A $40,000 printing plant has been contributed to the public schools of Philadelphia by the Philadelphia Typothetae, the Mergenthaler Linotype Company, and the Miller Saw Trimmer Company. It has been placed in the McCall School, where it will be available for evening as well as day-school classes in printing.

Smith-Hughes Course. The Iowa Educational Department has approved the Smith-Hughes vocational work recently established at Plymouth, Ia. Mr. Paul Bollinger has been named as vocational instructor.

Building Trade Classes. The Minneapolis school board has approved a request that boys in the woodworking classes of the East High School be permitted to work on Winter school, now under construction. The plan of having the boys do the constructive work has the approval of the local labor unions.

Tulsa Manual Arts Teachers Meet. The Manual Arts Club of Tulsa, Okla., met October 15-24, for a professional as well as social meeting, and particularly, to discuss the problem of home mechanics work as a part of the manual training activities.

The meeting opened at 5:30 P. M., with a dinner in the high school cafeteria. The meeting then adjourned to the music room, where talks were given by Dr. W. T. Bawden, J. J. Frisch, J. Haskell, Holderson, and C. O. Holley.

Those present included two from Hominy, three from Yale, one from Sand Springs, Okla., and 27 from Tulsa.

Schools for Plumbers and Steam Fitters. Interesting growth in the teaching of plumbing and steam fitting apprentices is indicated in a recent compilation of schools, prepared by the apprenticeship service department and the national plumbers' and steam fitters' association. A total of 64 schools are offering courses to apprentice plumbers and 35 are offering advanced courses for journeymen plumbers. Nineteen schools are enrolling steam fitter helpers and ten are giving advanced courses to steam fitter journeymen. On or before September 15, 1924, the schools enrolled the following number of students: Apprentice plumbers, 4,019; journeymen plumbers, 1,380; steam fitters' helpers, 577; steam fitter journeymen, 177.

First Vocational Department. Pierce's Level, twenty miles from Mobile, Ala., has the first vocational agricultural department established by the board of school commissioners. The school, known as the Tanner-Williams, has an enrollment of more than 150 pupils and is in a white section. The school is supported by federal and state funds, and the county school board, the federal government paying one-half of the expense and the state and county sharing equally on the remainder.

The department is located in an old school building, remodeled for the purpose. The board furnishes the materials and equipment, besides offering facilities for acquiring a knowledge of carpentry and forging as applied to farm conditions. Mr. W. E. Bryant has been employed to act as instructor at the school.

Teach Telephone Mechanics. Through the cooperation of Mr. James Holub of the Kenosha branch of the Wisconsin Telephone Company with the local board of education, pupils in the junior and senior high schools have been made acquainted with the complete story of the telephone. The telephone company recently printed and distributed copies of a pamphlet, "The Magic of Communication," among the pupils in the schools. The booklet tells the story of the transmission of speech over the telephone, from its origin in 1875 by Alexander Bell, to its present completeness and usability. It also discusses the theory of the microphone and its application to every day life in a most interesting way. The study is a part of the work covered in the science classes of the city schools.

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NEW BOOKS.

Problems in Architectural Drawing

By Franklin G. Elwood. Cloth, 131 pages, illustrated. Price, $2.25. The Manual Arts Press, Peoria, Ill.

The development of advanced drawing in high schools has, rather curiously, overemphasized machine drawing and has largely overlooked drawing applicable to building construction. It is hard to find a valid reason for this condition, but the great number of boys who enter the building trades have been neglected in favor of a few who enter the mechanical trades.

The present book will fill a real need for a book which is neither too elementary to interest boys of advanced high school age, nor too advanced to involve problems which are properly for college men. The first half presents the fundamental principles of architectural drafting, design, construction, strength of materials; and the second part consists of four groups of graded problems for study and practice. The statement of the problems is such that the students must actually work out the plans without mere copying. He has at the same time complete contacts with all the typical forms of construction and the usual classes of small buildings.

A Laboratory Manual of Machine Shop Practice

This text is especially adapted for students in vocational day and evening schools and provides a series of graded jobs intended to cover the essential bench and machine tool operations. The successive steps of each job are carefully outlined and ample notes are provided to make clear the principles involved in each type of work.

Reading Blueprints

By James K. Shallenberger. Paper, 59 pages, illustrated. Price, $0.88. The Manual Arts Press, Peoria, Ill.

This book has been prepared especially for machinists and pattern makers who desire in a short evening or extension course, the principles and conventions of mechanical drawing as a means of assisting them in reading the blue prints which they daily use. The book outlines very simply the principles of projection, sections, gears, dimensioning, assembly drawing, and shop sketching. A very practical final chapter consists of 21 problems for study.

Architectural Details

Louis Rouillion and C. G. Ramsey. Cloth, quarto, 132 pages. Price, 3. John Wiley & Sons, New York.

This book is not a text in architectural drawing in the sense that it provides a complete professional course including the elements of planning and design. It is rather a complete outline of what may more properly be termed "building drawing" for the junior draftsman who is mastering the first elements and the grammar of the graphic language of building construction.

The work is offered in the shape of plates presenting, first, typical building details; then, conventions and symbols; third, the principles of perspective; and finally, complete working drawings for a cottage and sketches and working drawings for a colonial frame house.

For the young high school student and the more mature man in the trades the book is an ample course in essentials.

The Elements of Machine Design

By S. J. Berard and E. O. Waters. Cloth, 323 pages, illustrated. Price, $2.50. D. Van Nostrand Co, New York City.

This book is intended to bridge the gap between the study of advanced machine design and advanced engineering drawing. It seeks to provide the student and the young draftsman with a wide amount of fundamental principles and data of mechanics, mechanisms, and strength of materials which he will require in the simple problems of designing machines and of developing the ideas of designers into usable sketches and drawings. The book takes up the elements of theoretical design, fastenings, shafting and couplings, bearings, belting and pulleys; spur, worm, bevel and screw gearing; cams, linkages, pistons and stuffing boxes, piping and fittings, and types of drawings and conventions, etc. Not the least value of the material is the insistence upon correct methods of working by (a) analysis, (b) application of theory, (c) modification of results in accordance with practice, and (d) preparation of sketches and drawings.

The book incorporates the latest official tables and formulae and is valuable as a reference as well as classroom text.

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Printing and Typography for Beginners

By Arnold Levitas. Cloth, 196 pages, illustrated. Price, $1.50. McGraw-Hill Book Co., New York.

This introductory text for part-time, evening, vocational and similar schools is arranged on the job basis and affords what is practically a self-teaching course. The subject of printing is divided into six units: (1) Composition, (2) stone work and press work, (3) typography, (4) printer's English, (5) mathematics, (6) materials. Each of the units is separated from the others by a heavy sheet of blue index bristol so that the student may readily pass from one job to another in the several units as his work and study require. The jobs are logical, progressive and well graded, and the accompanying text is adequate. The arbitrary grouping of imposition as secondary to press work, rather than an independent consideration of this important phase of work, will not appeal to many printers as altogether teachable. The book is accompanied by a well arranged teachers' manual.

Lettering Exercise Manual

Jonathan Bright and J. F. Faber. Paper, 64 pages. Price, 45 cents. The Bruce Publishing Co., Milwaukee, Wis.

The teaching of lettering, that bug-a-bear of the mechanical drawing room, is developed in this booklet by a series of tested exercises which have been evolved in the authors' classes. The work begins with plates intended to develop skill in letter formation. These are followed by exercises emphasizing letter combinations, spacing, arrangement, etc.

The degree is to be granted to students of the college of architecture, upon completion of a four-year course in which the subjects of decorative design, interior decoration, etc., have been taken in connection with academic studies, leading to the bachelor's degree.

PUBLICATIONS RECEIVED

Standard Grading Rules of the California White and Sugar Pine Manufacturers' Association. Issued September 15, 1924. The booklet gives the grades and nomenclature of yard lumber, rules for factory lumber, standard sizes, grades of cuttings, and lath grades.

Posters Prepared by School Children in Milk-for-Health Programs. By Jessie M. Hoover. Miscellaneous Circular No. 21, August, 1924, issued by the U. S. Department of Agriculture. The posters were made in connection with programs carried on by the communities in which children live, and with the cooperation of the state agricultural college, the dairy division, the Bureau of Animal Industry, and the Department of Agriculture. The posters covered such points as "milk for health," "milk a food for children," and "milk a food for athletes."

Government Specification for Water-Resisting Spar Varnish. Circular No. 103 of the Bureau of Standards, U. S. Department of Commerce. Contains the specification officially adopted by the Federal Specifications Board for use in the purchase of varnish materials by departments and independent establishments of the government. Varnish suitable for outside and inside surfaces must be resistant to air, light and water. It should meet the standard requirements for appearance, color, flash point, non-volatile matter, setting quality, working properties, safety for working, water resistance and toughness.

Everyday Art. October, 1924. Issued by the American Crayon Co., Sandusky, O. Contains news and comments on the future of school and industrial arts. It contains two articles, one on "Art Observations in Spain," by James C. Boudreau, and "Line in Dress Design," by L. R. Crawford.

Unit Courses in Auto-Mechanics. Prepared by the Kansas State Teachers' College, in cooperation with the State Board of Vocational Education, and issued by the College at Pittsburg. The course outlines a practical plan of instruction for auto-mechanics in the form of short unit courses which may be used in unit trade schools and trade-extension evening classes.

Delicious Dishes. Paper, 103 pages. This is a practical cook book compiled by the teachers and pupils of the domestic science department in the Empire Junior High School at Cleveland, Ohio. The illustrations for the book and the verses on the pages preceding the several chapters were prepared by the art and English classes respectively, and the entire book was printed and bound by the printing and book binding classes.

Equipping for and Teaching Sheet Metal Work.—Paper, 15 pages. Issued by the Peck, Stow & Wilcox Co., Southington, Conn. Contains suggestions for equipment, the outlining of a course, the practical use of the machines used, and the presentation of the project for development by the pupils.

Thirty-Ninth Annual Report of the Roxbury Boys' Club and Institute of Industry, Roxbury, Mass. Contains a general outline of the varied activities of the club, a statement of the annual expenditures, and a description of the work accomplished in the three vocational classes. A trust fund of $25,000 has been created, to be known as the Ely Trust Fund, the income from which will be used for vocational classes for worthy boys in mechanical and scientific lines.

Investigation of Nursing as a Professional Opportunity for Girls. Florence E. Blazier. Bulletin of the School of Education, Indiana University. The pamphlet discusses the typical forms of nursing service as opportunities for professional training for girls. There is also a short bibliography giving information about the profession of nursing.

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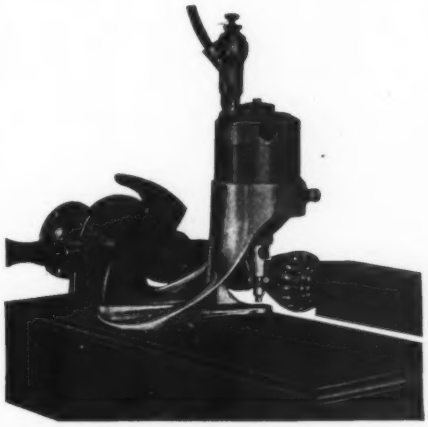

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NEWS AND NOTES.

New Vocational Department. The vocational building at Johnstown, Pa., has been razed to make way for a new high school in which additional shop opportunities will be offered. The building originally served as a unit trade and continuation school plant. The machine, mill wood shop and drafting rooms have been temporarily taken care of in the old high school, while the vocational print shop is for the present located in the junior high school.

Day School Plumbing Course. A successful evening course for apprentice plumbers has been operated at Johnstown, Pa., for several years. The work has now been expanded to include day instruction classes under the direction of Mr. J. W. Trent, a trade school graduate and a practical plumber. The master plumbers of the vicinity have given their support to the work.

Auto-Mechanics Work. An auto-mechanics shop has been established in the Cochran Junior High School at Johnstown, Pa., for work in the second semester. Cars and parts have been donated by the local automobile association and the course will be conducted as try-out work leading to a definite trade course in the near future. Mr. S. G. Porter is the instructor.

Formulate Guidance Program. Under the direction of Supt. S. J. Slawson of Johnstown, Pa., the vocational guidance program has been given considerable attention during the past year. The entire school faculty has been organized into a comprehensive group of committees with well-defined duties and a satisfactory cumulative record system has been placed in operation. Miss Mary F. Howe has been added to the group of guidance experts.

Vocational Agriculture. The Alton high school at Alton, Kans., opened with a total enrollment of sixteen in the vocational agriculture class. Twelve freshmen were enrolled and four sophomores continued with second year work.

Show-Card Writing Classes. One of the important evening classes of Kansas during the present school year is a class in show-card writing conducted by Edward Klager, at Chanute. The class is composed of workers in Chanute department stores who seek to gain proficiency in the making of artistic show cards.

New Vocational Building. A vocational building for the Cherokee County, Kansas, Community High School, has been completed. The building is two stories high and was erected at a cost of $24,000. The building will be occupied by the departments of vocational agriculture and industrial arts, which are under the direction of Mr. E. A. Clawson and Mr. G. R. Wallace, respectively.

Increase in Home Making Students. An analysis of the number of girls enrolled in vocational home making classes in the high schools of northern Kansas shows a decided increase this year over last year. The number of girls taking this course varies from 21½ per cent to 70 per cent of the total number of girls in school. Last year the classes showed a percentage enrollment ranging from ten per cent to 60 per cent. This year, every school but one shows a gain in percentage of from three per cent to 42 per cent, and the greatest gain was made at Havensville.

Teacher-Training Course. A comprehensive course in teacher training for all teachers in day and evening schools has been established at Wichita, Kans. The work will extend over a period of about two years.

Home Making. Two units of home making, dressmaking and home furnishing are being offered to the women of Pittsburg, Kans. Forty women have enrolled for the courses.

Home Making Cottage. The Kozy Kottage is a new plan attempted at Cleburne, Kans., high school for carrying out the school's idea of home making. The class has been organized into a club and six girls stay at the club from Monday to Friday during the school year. The girls actually do the home work in the cottage. They have carried out a number of special projects involving papering, painting and the making of window drapes, table runners, buffet scarfs, tablecloths and napkins for use in the cottage. For carrying out the work, the class was divided into four groups, comprising the kitchen, house care, hostess and sewing groups.

Evening Home Making Classes. A large group of women has enrolled for evening classes in home making at Parsons, Kans. The units offered are pattern making and fitting, dressmaking, millinery, budget making and home nursing.

Hobby Fair Held. A Boys' Hobby Fair was held at Cincinnati, O., during the week of October 25 to November 1, in connection with an extensive exhibit of boys' products. The affair was directed by the Cincinnati rotary club as a part of the program of boys' week and the exhibit was held at the Business Men's Club building. The exhibitors were all boys who had not passed their eighteenth birthdays and the exhibit included displays of work in art, photography, natural history, mechanics, woodwork, electricity, machine-shop work, machine draughting, manual training, pet stock, pigeons, poultry and dogs. In the art department, a special prize was awarded for the best poster for Boys' Week or Boys' Hobby Fair, all posters submitted remaining in the possession of the boys' week committee.

Prevocational Course. Under a new law which became effective in Rhode Island in September, 1924, it has been necessary for the board of Providence to provide additional accommodations for a large number of children who must remain in school until they reach the age of 15 years. In the past, approximately one thousand boys and girls have left school before this age to enter employment. It is planned to provide prevocational work for this group in one or two of the city's vacated buildings.

Household Mechanics Course. The school board of Alton, Ill., has approved a recommendation of the superintendent providing for the establishment of a course in household mechanics in junior high schools. The course will include simple repair work in electricity, sheet metal work, plumbing, and concrete construction.

Apprentice Training. Each brick-layer, plumber, machinist and carpenter apprentice in the city of Cleveland is required to attend school for four hours each week. Through intensive training, the apprentices become skilled journeymen in a short time. There are 502 of these apprentices in school classes conducted under the Smith-Hughes law.

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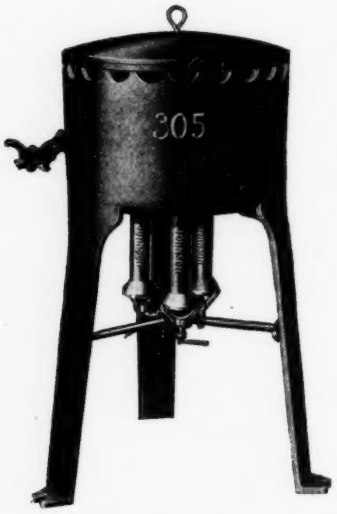
BUYERS' NEWS.

New Melting Furnace. The Johnson Gas Appliance Company of Cedar Rapids, Iowa has just announced the addition to the Johnson line of gas furnaces and appliances the new Johnson No. 305 Soft Metal Melting Furnace. This furnace is fitted with a removable 300 lb. capacity cast iron melting pot, with a removable lid and outlet valve for drawing off the molten metal. It is very simple in construction, economical in gas consumption and easy to operate. The furnace is especially adapted to school use for melting soft metals used in the foundry, for recasting linotype and monotype metal, etc.



JOHNSON No. 305 SOFT METAL MELTING FURNACE.

Everyday Art.—The November issue of Everyday Art is devoted to a discussion of dynamic symmetry, the use of dyed paper for making gifts, and design and art in the rural community. Copies are available from the American Crayon Company, Sandusky, Ohio.

PERSONAL NEWS NOTES.

Mr. R. Herrin, formerly principal of the University Heights, Okla., high school, has been appointed as shop teacher in the Capital Hill Junior High School.

Mr. Theodore Dillaway, formerly director of manual arts at Boston, Mass., has accepted a position as director of art in Philadelphia.

Mr. G. F. Hatch, of the Brighton high school, Boston, has been promoted to assistant director of manual arts.

Mr. Wm. J. Doherty, of the Boston Trades School, has been promoted to instructor in machine-shop practice in the Mechanic Arts high school.

Mr. I. L. Pearce, formerly a teacher of manual training in the elementary grades of Kansas City, Mo., has been appointed to a position in the Central Junior High School of the same city.

Mr. Joseph Hackett, formerly an instructor in wood-working in the Fall River, Mass., Continuation School, has accepted a position in the Mechanic Arts high school, Boston.

Mr. R. H. Krewson has been appointed supervisor in the division of industrial arts, at Philadelphia, under Charles F. Bauder, director. Mr. Krewson holds a degree from the University of Pennsylvania and a certificate given by Drexel Institute, and has had experience in teaching machine construction.

Mr. J. B. Yingling, formerly a teacher of manual training at Wichita, Kans., has accepted a position as director of vocational education in the same city. He succeeds O. B. Badger, who has gone to the A. & M. College at Stillwater, Okla.

Mr. G. H. Nicholas, of Ely, Minn., has accepted a position as teacher of cabinet-making in the Manual Training High School at Peoria, Ill.

Mr. F. E. Hardin has been appointed as a teacher of manual training in the grades of Peoria, Ill.

Mr. Wm. E. Cunningham is teaching manual arts at Highland Park, Ill.

Mr. Ross Popham is teaching manual training at Urbana, Ill.

Mr. M. D. Mohler, formerly a teacher of manual training in the elementary schools of Kansas City, has been transferred to the Northwest Junior High School of the same city.

Mr. Arthur Freeburg is teaching home mechanics at Winona, Minn.

Miss Helen Hinchman has been appointed to take the place of Miss Edythe Reese, as instructor in cooking at the Cochran Junior High School, Johnstown, Pa. **Miss Ruth Korns** has also been added to the home economics staff in this school.